DIOnavi. Surgical Manual_E Ver 7.1

Product Introduction: DIOnavi.

Surgical Process

DIO IMPLANT

DIOnavi.

Surgical Manual Ver 7.1

DIOnavi. Surgical Manual includes detailed guide for every step of the DIOnavi. Workflow, from data collection to placing orders and surgical procedures.

** The products shown in this manual are sold by DIO. Please contact your local sales representative for inquiries.*

CONTENTS

04 **DIOnavi. Introduction**

04 DIOnavi. Workflow

06 How to order

08 **DIOnavi. Process**

09 1. CT Process

09 ① F.O.V size

09 ② Occlusion at the time of filming

10 ③ CT resolution

12 2. Scan Process

12 ① Necessity of CT and Intra oral scan

13 ② Check scan

14 ③ Manufacturing of precise plaster model

15 ④ Scanning method for each case

15 - Normal case

16 - Case with metal prosthetics

18 - Partial edentulous case

20 - Edentulous Case

23 ⑤ Edentulous scan - Scan retractor

26 3. Order Process

27 4. DIOnavi. Surgical Guide Design

27 ① Consolidation

27 ② Implant planning

29 ③ Planning confirm

30 ④ Surgical guide design

32 **Surgical Process**

33 1. Caution / Checklist for safe placement of DIOnavi. Guide

35 2. DIOnavi. Surgical Kit Line-up

37 3. Surgical Kit Components

- DIOnavi. Master Kit
- DIOnavi. Narrow Kit
- DIOnavi. Protem Kit
- DIOnavi. Wide Kit
- DIOnavi. Flapless Crestal Sinus Kit
- DIOnavi. Special Kit

61 **TIP. How to use surgical tools for each type of surgery**

62 1. Case of extraction immediately after

64 2. Case with small opening

66 3. Sinus Case

71 4. Edentulous Case

DIO PROBO Z
UV Activator 2
DIOnavi. Surgical Guide Design
Medit i700
DIO IDx
DIOnavi. Full Arch
DIOnavi.
DIO Ortho navi.

DIOnavi. Workflow

Order

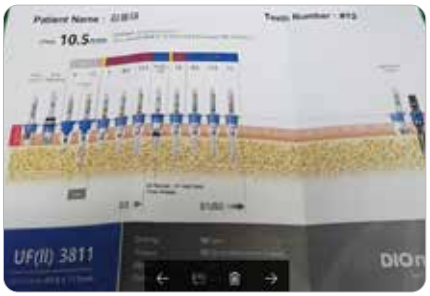
Clinic Upload CT file and place order on DIOnavi. website.

Oral scan

Clinic Send scanned file using intra oral scanner from 3Shape server to the DIOnavi. Center.

01 02

07



Packing & Delivery

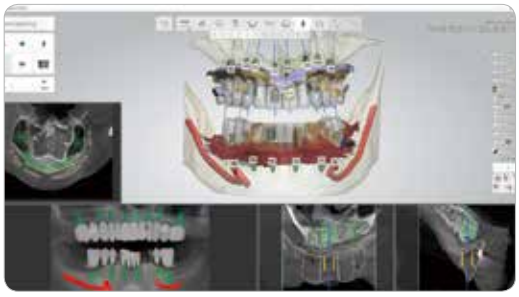
DIOnavi. Center Pack and deliver DIOnavi. Guide and Drilling Protocol plus abutments, TC, and AJ from the lab.

Clinic

DIOnavi. Center

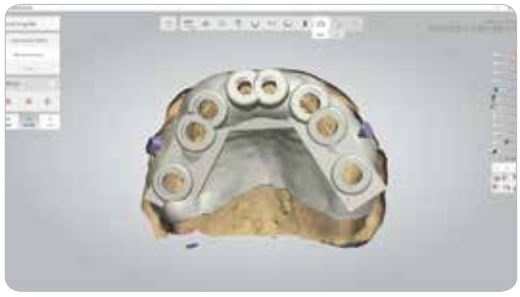
Dental laboratory

SA - Stock Abutment
CA - Custom Abutment
DA - Digital Abutment
TC - Temporary Crown
AJ - Abutment Jig



Planning

DIOnavi. Center Start implant planning following details of the order.



Guide design

DIOnavi. Center

Design surgical guide according to implant planning

Clinic

Confirm the planning on DIOnavi. website

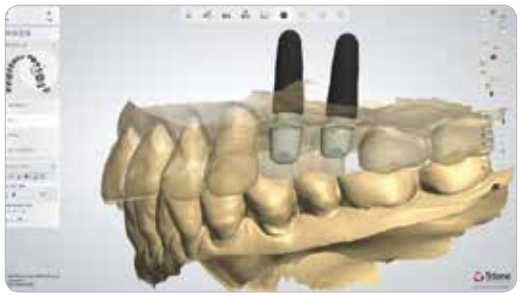
03 » 04

06 05

Production

DIOnavi. Center Dental laboratory

Surgical guide, CA, TC, and AJ are fabricated. SA or DA may be used in place of CA.



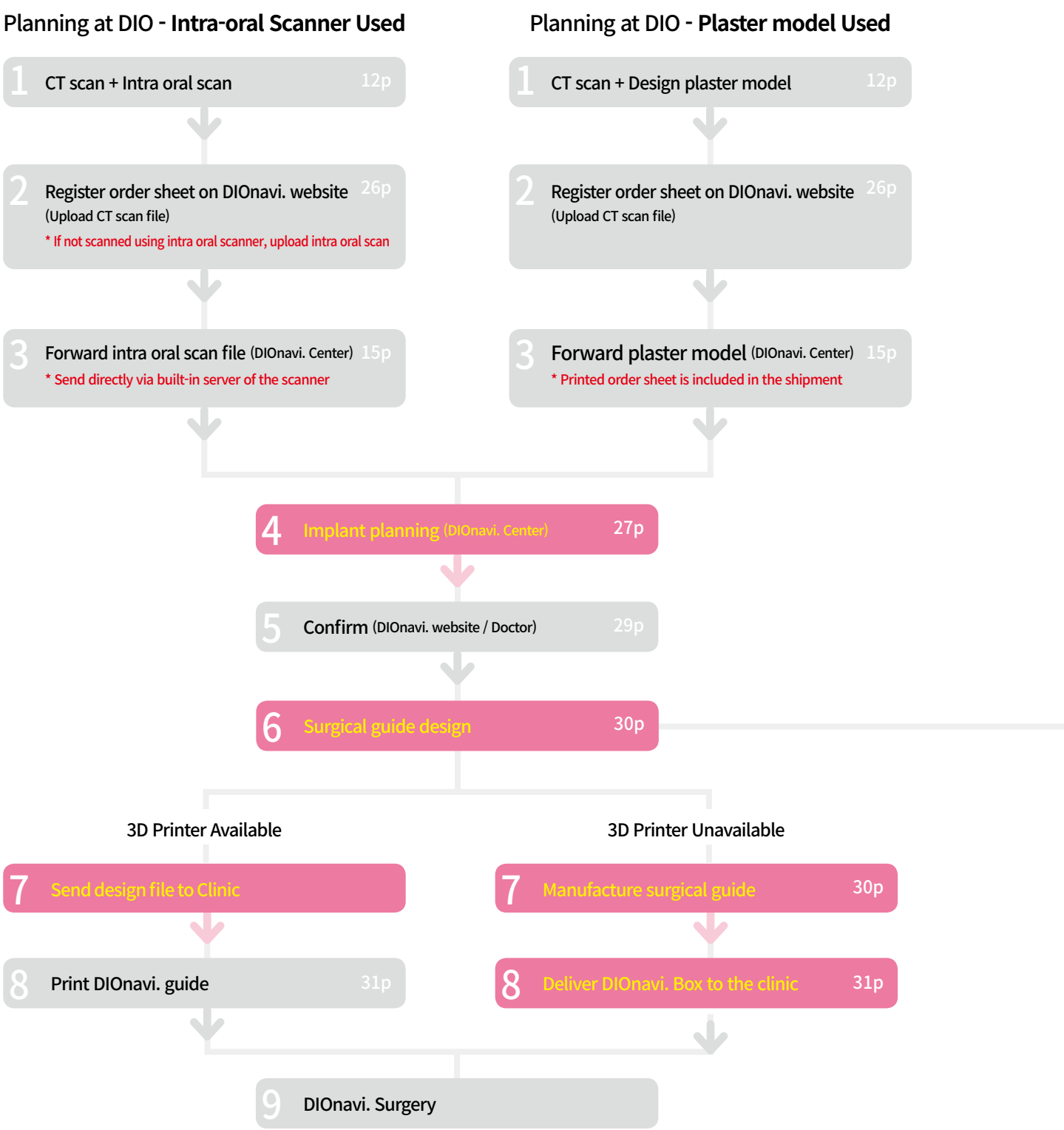
Prosthetic design

DIOnavi. Center Dental laboratory

If requested, custom abutments are designed according to implant planning

How to order

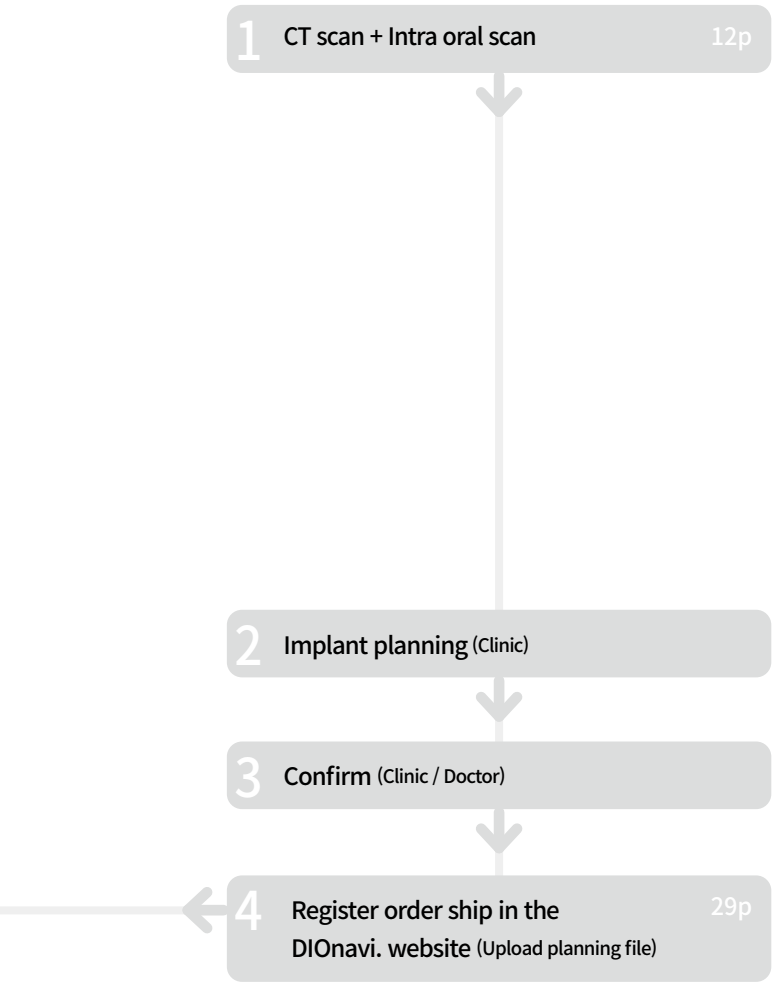
With proper submission of CBCT scan and intra-oral scan data, a DIOnavi. Box, consisting of surgical guide, abutments, and abutment jigs will be delivered at your door within 7 business days.



Planning at Clinic - **Intra-oral Scanner Used**

Clinic

DIOnavi. Center



DIOnavi. Process

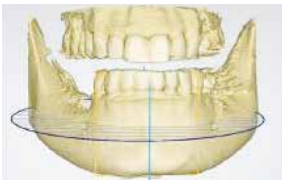
1 CT Process

Confirm CT

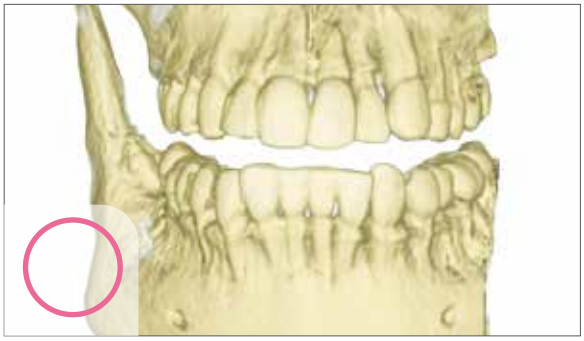
The equipment used and general conditions at practices will vary, influencing the precise quality of DIOnavi. Solution. We recommend following checkpoints when taking CBCT scan.

① F.O.V size

Check the F.O.V size of dental clinic's CT in advance.
Case may be limited depending on the size of F.O.V.

	If larger than 10 x 8.6cm	8 x 8cm	8 x 5cm
Scan image			
Range of Indication	Full Arch	From the most posterior molar on one side to the premolar on the opposite side (1~8 units)	From the most posterior molar on one side to the anterior (1~8 units)
Remarks	-	If implantation has wide range but FOV is small, surgical guide can be made in two pieces.	

② Occlusion at the time of filming



Open bite (Normal case)

Close bite (Splint or Denture)

Caution Close bite in normal case does not include full information required to produce an accurate surgical guide.

Tip Open bite can be achieved by patient biting into a gauze.

③ CT resolution

If the resolution of dental clinic's CT is poor, information taken such as of bones, teeth and nerves etc may not be visible. Preliminary adjustment is necessary prior to CT if the resolution is poor.

CT reiteration

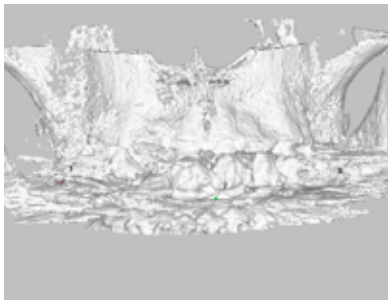
Cause of error

Reiteration of CT images due to movement of the patient at the time of filming.

Solution

Re-scan ensuring the patient is kept still.

CT scattering



Cause of error

Metallic substance in the mouth causes metal artifact, making it difficult to determine merging points.

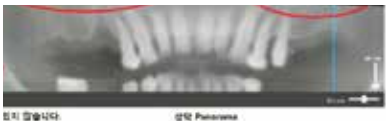
Solution

Scan and take CT image after having attached a resin or a marker on the area of such prosthesis.

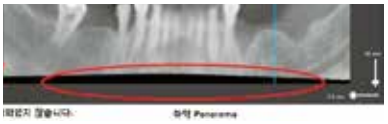
* Refer to p15 for more detailed instruction of attaching a resin or a marker.

CT cut out

Sinus Case · Cutting of maxillary sinus



Mandibular case · Cutting of mandibular nerve



Anterior tooth area case · Cutting of anterior tooth area

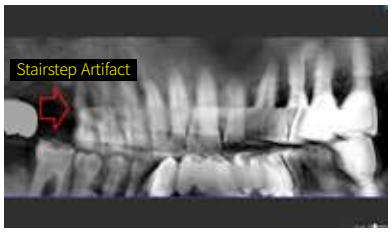
Cause of error

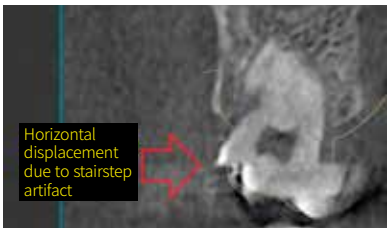
An accurate surgical guide cannot be made without information on some critical anatomical structures. (Maxillar : Sinus / Mandible : Inferior alveolar nerve)

Solution

Need to reset the CT domain.

CT fault





Cause of error

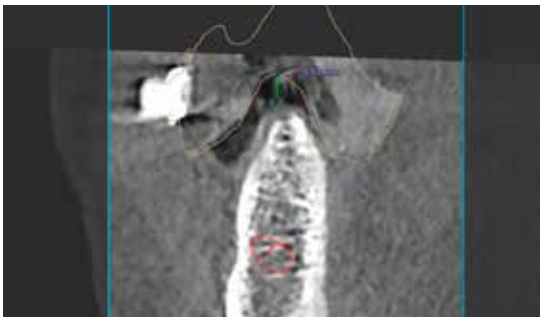
Error in the CT filming method.

Solution

Contact the manufacturer.

Wearing of denture or splint
(In edentulous case)

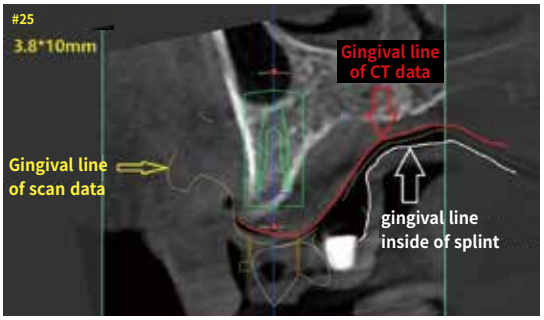
Non-settlement of denture



Cause of error
Difficulty appears in finding an accurate matching point in edentulous case due to weak placement of denture or splint.

Solution
Retake the CT in close bite after having firmly placed onto a patient's gum.

Non-settlement of splint

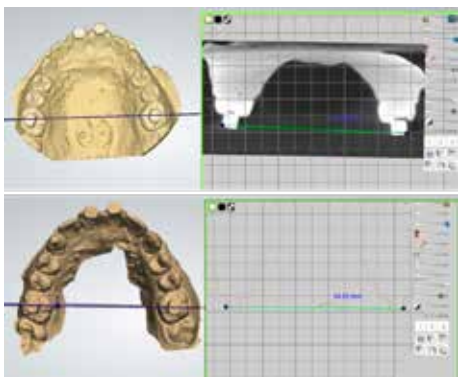


Horizontal error in CT

If there is horizontal error in CT, it could result in matching failure or cause distortion in direction during surgery. If more than 0.5mm of error occurs, correction must be made.

How to check CT error by using plaster model

Attach a marker onto the plaster model and measure the actual distance.



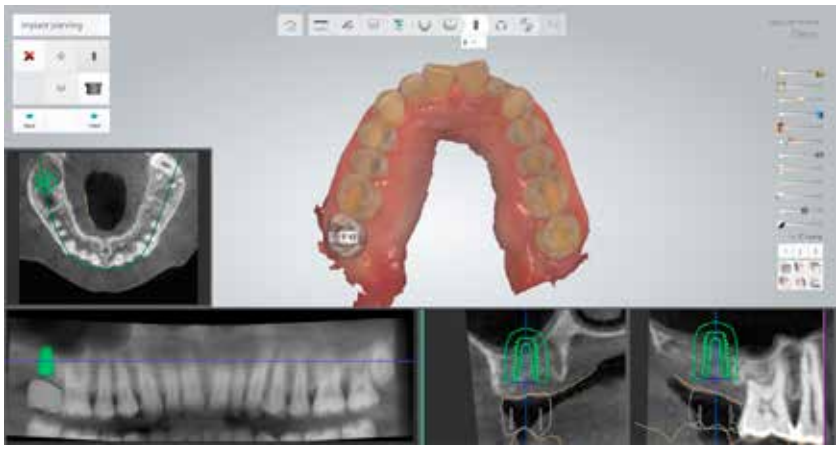
Take CT image of the plaster model and compare the measurement with the actual distance.

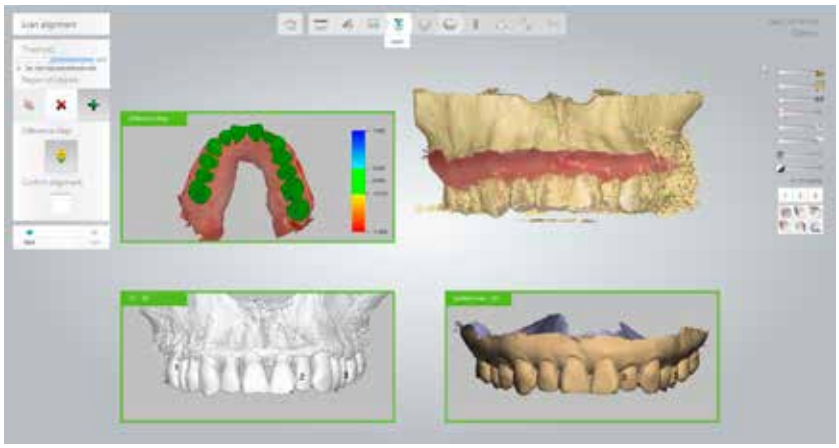
※ If the measurement taken is different, please contact the manufacturer to make the correction required.

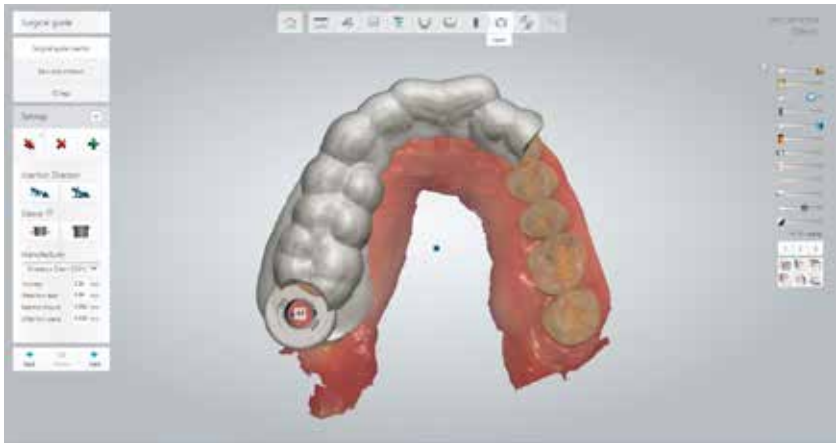
2 Scan Process

① Required Data : CBCT and Intra-oral Scan

With CT scan data, we can identify teeth and bone information but not gingiva.
With Intra-oral scan data, we can identify teeth and gingival information but not the bones.
Since we need all three information, of teeth, bone, and gingiva, we need to collect both CT and oral scan data and merge them, using the teeth as the common denominator.







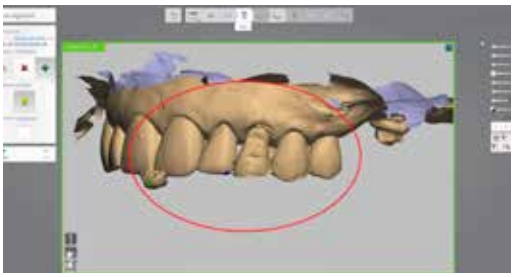
② Check scan

When performing DIOnavi. a precise intra oral scan is required to accurately place the guide onto a patient's intra oral. It is necessary to check for any partial or distorted area before finalizing the scan.

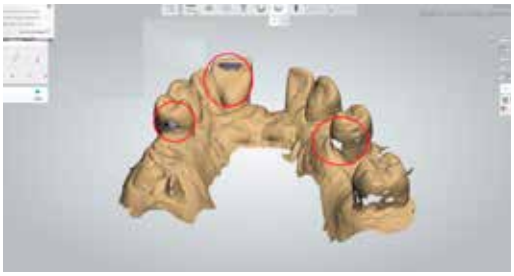
※ Press the surface button to a black and white viewing mode for better clarification.

Scan error case

Scan reiteration



Scan perforation

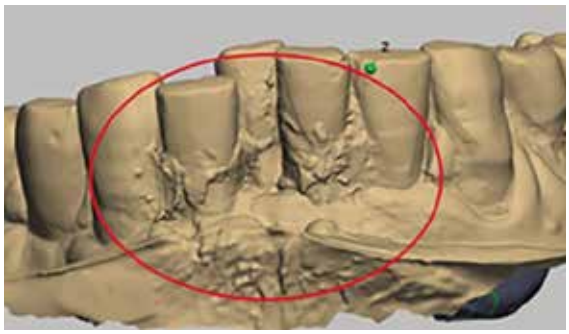


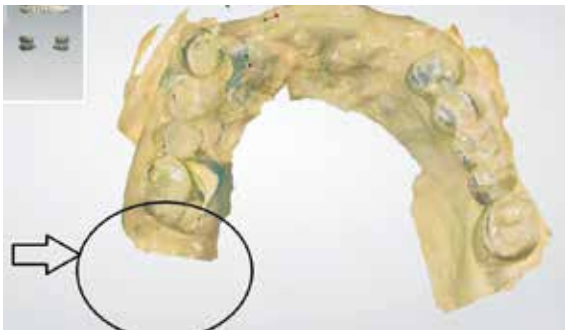
Excessive scan

Lack of scan domain

③ Manufacturing of precise plaster model

When performing DIOnavi. a precise designing of plaster model is required to accurately place the guide onto a patient's intra oral. Carefully check for any deformation of plaster model.

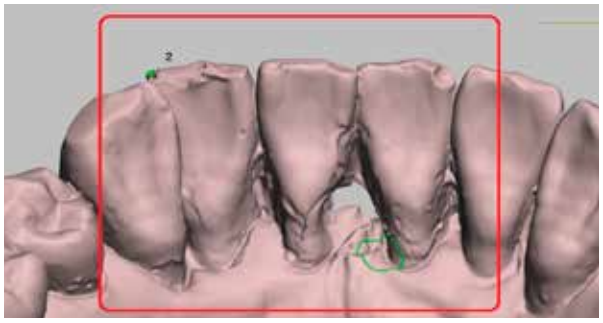




※ Silicone impression material is recommended to be used on the operated area.

Plaster model error case

Deformation of impression / Occurrence of air bubble



* Manually deleted by the dental clinic

Plaster model fracture

④ Scanning method for each case

Depending on the patient's intra oral condition, relevant case from the listed should be selected;
Normal case / Metal artifact case / Partial edentulous case / Edentulous case.

Normal case

▸ If the dental office has intra oral scanner

Scan carefully ensuring there is no empty space in the tooth next to the operated area.
Acquisition of an accurate impression taking is necessary since the surgical guide is manufactured on the basis of scanned data.

- Scan all of maxillary / Bite / Mandibular sections
- Convert the color mode to black & white and check precisely after having scanned with intra oral scanner
- Intra oral scanner lab account : Select DIOnavi.
- File name : Hospital name – Patient name

CT scan (Film with open bite)

+

Intra oral scan (Maxillary scan / Mandibular scan / Occlusion scan)

▸ Manufacturing with plaster model

- All of listed impression taking is required; Maxillary / Bite / Mandibular areas
- Be aware of any air bubble or sharp parts in the model

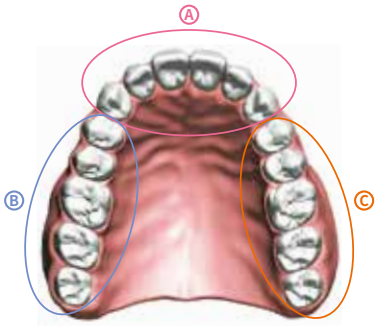
CT scan (Film with open bite)

+

Case with metal prosthetics

Attach resin or marker

- Attach to the arch where surgical guide is to be manufactured.
- Attach widely to 3 locations inside the intra oral except from the operated area.
- Dry the occlusion surface with air etc, and apply sufficient amount of flow resin which then should be placed with a resin or a marker and irradiated with photopolymerizer for around 10 seconds.



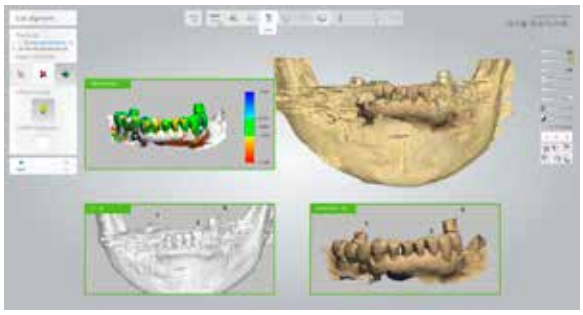
Direction on attachment of resin or marker

- Attach if there is metal prosthesis in the A zone.
- Attach if there is metal prosthesis in the B zone.
- Attach if there is metal prosthesis in the C zone.

※ Attach resin or marker if there are any continuous prosthesis in each zone.

▸ If the dental clinic has intra oral scanner

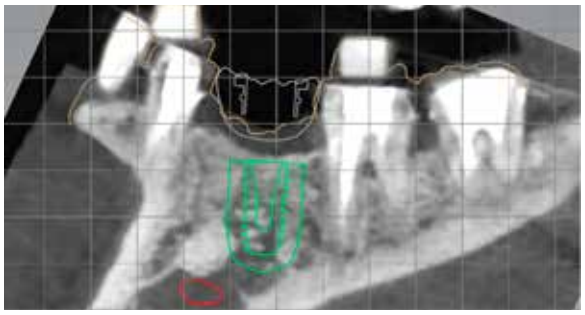
① Scan after having attached a resin or a marker on the arch of the operated area.
② Take CT image with a resin or a marker attached. (Be aware of detachment from moving / Open bite)
③ Scan occlusion with antagonist teeth having removed any resin or marker.



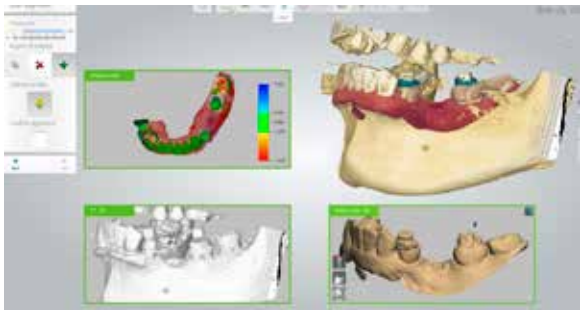
Intra oral scan with a marker attached

Take CT image with a marker attached

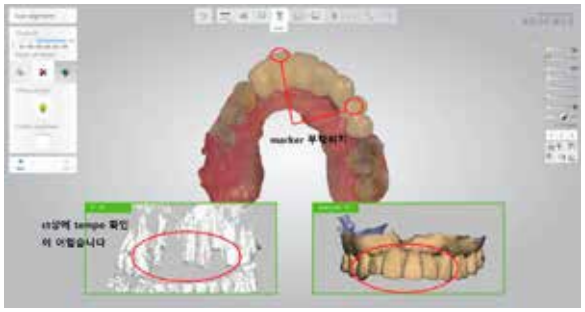
*** A marker must be attached in the case of temporary crown**



Take CT image with a marker attached



Intra oral scan with a marker attached



Data of temporary crown without a marker attached

▸ Manufacturing with plaster model

CT filming **Before attachment of a resin or a marker**

① Be aware of detachment of a resin or a marker whilst moving from one place to another for CT filming.
② Make sure that resin or marker is fully included and not cropped.
③ Take CT image in open bite.

Impression taking

① Produce plaster model after having taken the impression with a resin or a marker attached.
※ Be aware of detachment of a resin or a marker whilst impression taking.
② Impression of relative teeth to antagonist teeth.
③ Bite impression
※ It is recommended that rubber material is used for impression taking of the working side.

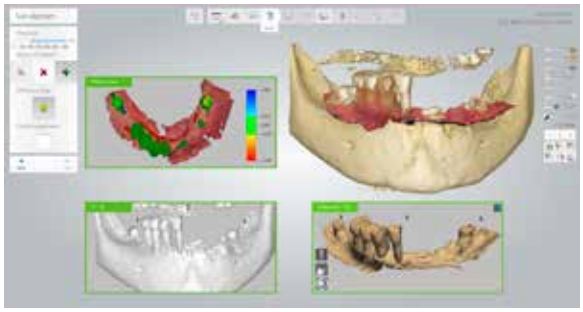
Scan CT (Open bite) with a resin or a marker attached

Produce plaster model from impression taking of the working side with a resin or a marker attached

Bite impression

Partial edentulous case

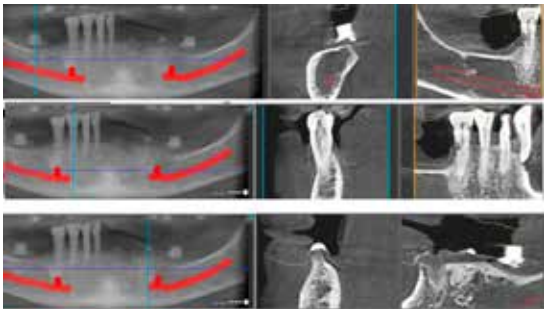
▸ If the dental clinic has intra oral scanner



① Attach resin or marker to the arch of the working side (Histoarcryl to be used)

② Scan antagonist teeth

③ Bite scan (Only if the bite impression is possible)



④ Scan CT with a resin or a marker attached

* Note when attaching a marker

01

Hold a marker with a pair of tweezers and place on the gum or an occlusion surface desired to be attached

02

Apply flow resin and process curing with photopolymerizer

5~10 seconds

03

When attaching to gum, use Histoacryl, which is not necessary when attaching to teeth

20 seconds

* How to attach flow resin using histoacryl

01

Pour flow resin to the gum where to be attached

02

Process curing with photopolymerizer

5~10 seconds

03

Apply histoacryl around the resin

Histoarcryl

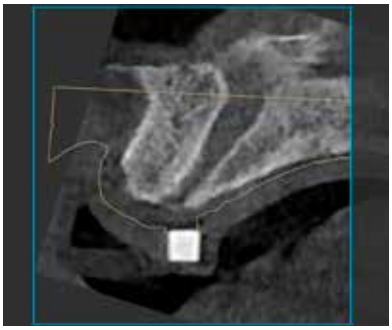
▸ Manufacturing with plaster model

① end the finished maxillomandibular plaster model to DIOnavi. Center. (Bite index is not required)

※ If Bite index is available, it can be sent along with the plaster model in which case the splint need not be returned to DIOnavi. Center after filming.

② Manufactured splint will be sent to the dental clinic from DIOnavi. Center.

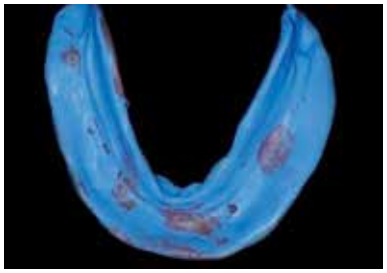
③ Check occlusion by using the splint. (Bite + V.D check)



④ Scan CT with the splint placed inside the intra oral.
(When manufacturing the splint, scan in close bite)

Edentulous Case

▸ If the dental clinic has both intra oral scanner and denture



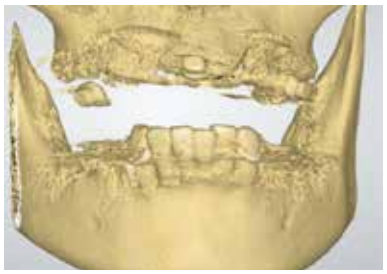
① Reline interior of a denture with impression material.

② Attach marker on the exterior of a denture.

③ Scan teeth and both of interior/ area where the marker is attached.

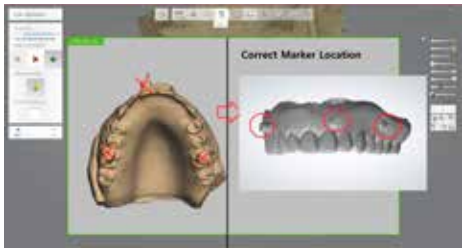
④ Place the denture with the marker attached inside the intra oral.

⑤ Scan in bite once the denture is firmly placed.

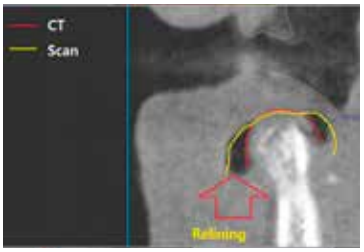


⑥ Scan CT of a firmly placed denture.

* Precautions when using denture



01. Note when attaching marker



02. Note when relining

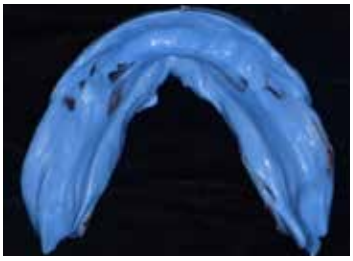
03. Note when scanning denture

Attach a total of 3 including 1 on the anterior tooth section, and 2 on the molar areas on both sides.
Attach close to the border section of the denture.

▸ Manufacturing with intra oral scanner and wax denture

① Immerse in hot water (44℃~55℃) for 10 seconds.

② Insert inside the patient's intra oral to form the shape of interior.



③ Insert the impression material inside the wax denture .

④ Place the wax denture inside a patient's intra oral with a marker or a flow resin attached.

⑤ Scan both inner and external sides of the Wax denture and the antagonist teeth.

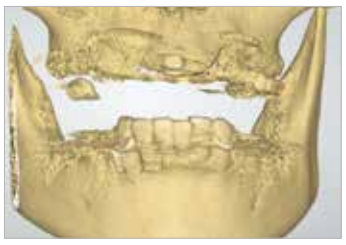
⑥ Scan CT with the wax denture fitted.

▸ Manufacturing with plaster model and splint

① Send the finished maxillomandibular plaster model to DIOnavi. Center.

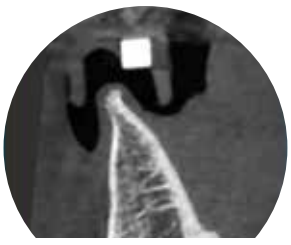
② Manufactured splint will be sent to the dental clinic from DIOnavi. Center.

③ Check occlusion by using splint.



④ Scan CT with a splint fitted.

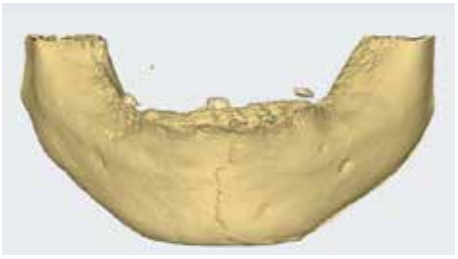
Case with a firm placement of splint



Case with a misplacement of splint

▸ Manufacturing with plaster model and splint

① Attach marker or flow resin in the intra oral using histoacryl.



② Scan CT.

③ Produce plaster model from the impression taking.

※ Be aware of detachment of resin or marker during impression taking.

④ Immerse in hot water (44℃~55℃) for 10 seconds.

⑤ Insert inside the patient's intra oral to form the shape of interior and check the bite .

⑥ Send all of the maxillomandibular plaster model and wax denture to DIOnavi. Center.

⑤ Edentulous scan - Scan retractor

Reduced in time by removing any hindering sources at scanning with an increased accuracy of scanned data in edentulous case.

▸ To utilize

01 Clear recognition of maxillary palate.

02 Control over the movement of tongue/cheek(Mandibular).

03 Act as a control point in intra oral scan.

	Maxillary	Mandibular
Prior to the use of scan retractor	Difficult to identify the boundary with an attached gum or an alveolar mucosa etc.	Intra oral scan not possible due to movement of tongue etc.
After the use of scan retractor	**Clear recognition of maxillary palate.**	**Control over the movement of tongue.**
Configuration of scan retractor	For maxillary	Mandibular area

*** Example of utilization (Mandible)**

Select the scan retractor appropriate for the arch and adjust accordingly to fit the intra oral.

▸ Application method

01

Keep the area of scan retractor wished to be used with a fair amount of moist.

02

Wearing surgical gloves, insert a finger into the intra oral to lift one of the corners of the mouth away from the teeth and insert the scan retractor starting from one corner into the intra oral.

03

Check for any compression caused to the lips or cheeks by the Scan retractor.

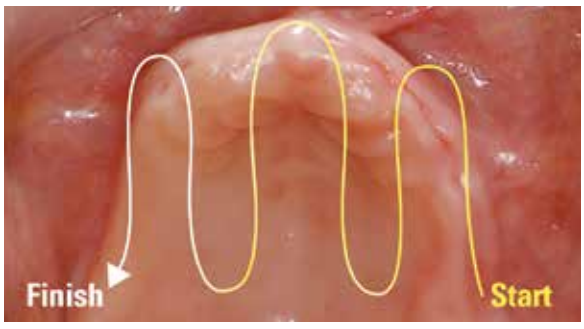
04

While executing intra oral scan, keep the handle of the scan retractor steady to prevent any movement within the intra oral.

05

Carefully remove the scan retractor out of patient's intra oral after the use ensuring no damage is caused to the dried lips of the patient.

▸ Order of scanning



Upper

Left maxillary molar area → Anterior tooth section → Left molar area palate → Central palate section in the Anterior tooth section → Right palate section in the Anterior tooth section → Right molar area in the Anterior tooth section

Lower

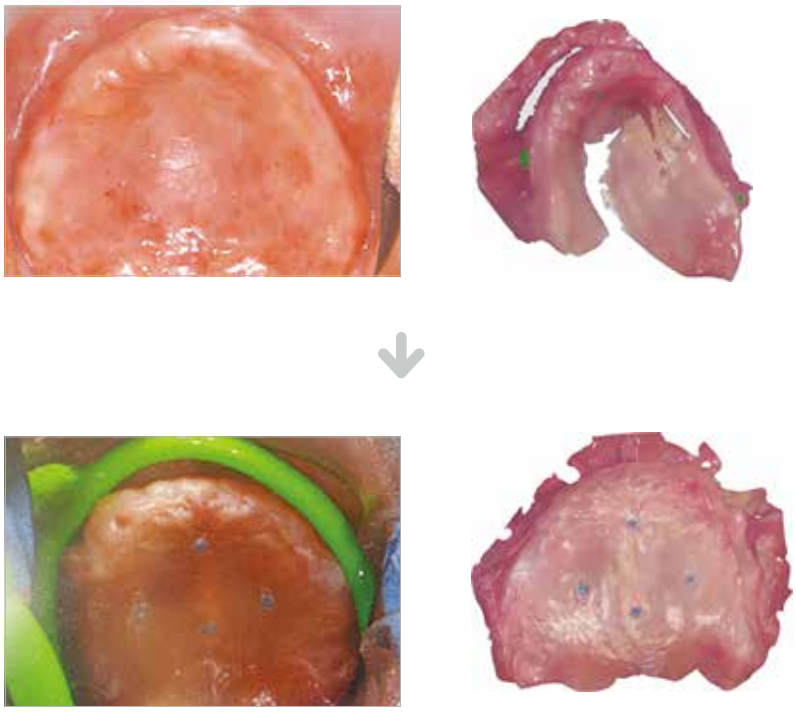
Right mandibular molar area → Anterior tooth section → Left mandibular molar area (When moving, scan in zigzag form from facial side to lingual side / from labial side to lingual side)

▸ Precautions in usage

01 Difficulty in scanning if the palate of the patient is excessively flat.

02 The scan retractor must be stationed and be aware of an excessive distension of soft tissue or compression.

03 When scanning, the patient must breathe through nose while stayed still.



Scan the palate with flow resin attached

3 Order Process

Order process may vary by country.

Please contact your local sales representative to learn more.

DIO navi. Center

4 DIOnavi. Surgical Guide Design

Design process using implant studio

01 CT + Intra oral scan Consolidation
02 Implant planning
03 Planning confirm
04 Surgical guide design

① Data merging

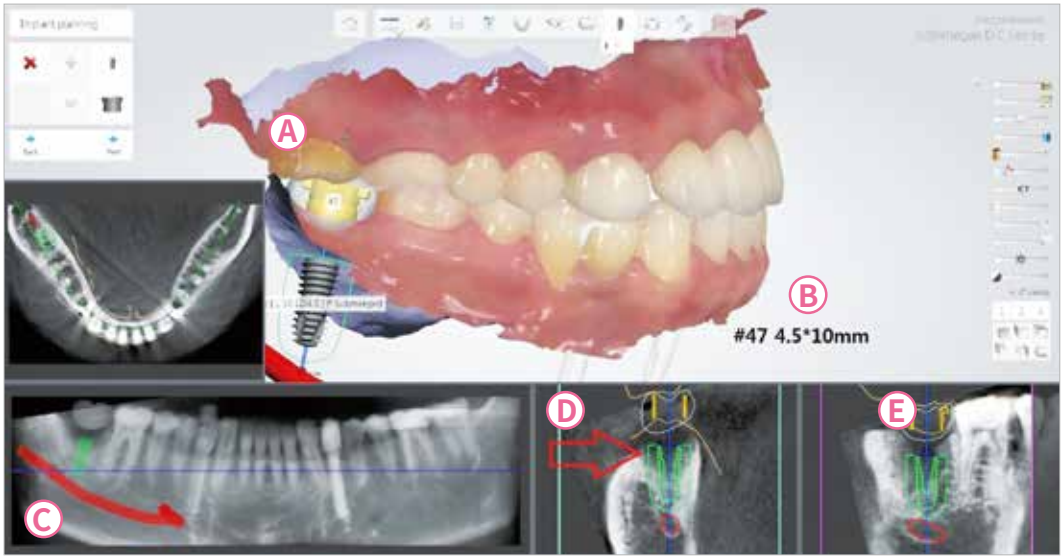
▸The CT and oral scan data can be merged using the teeth as common denominator.

Caution It is critical that the oral environment must be identical in both CT and intra-oral scan data, meaning the data must be collected on the same day.

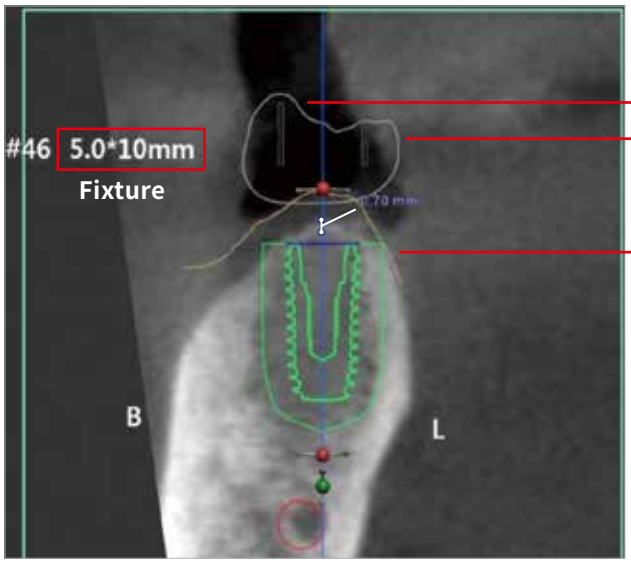
▸Scan with open bite.

Caution To avoid any difficulty in obtaining information required for consolidation we recommend filming in open bite and not with close bite.

② Implant planning



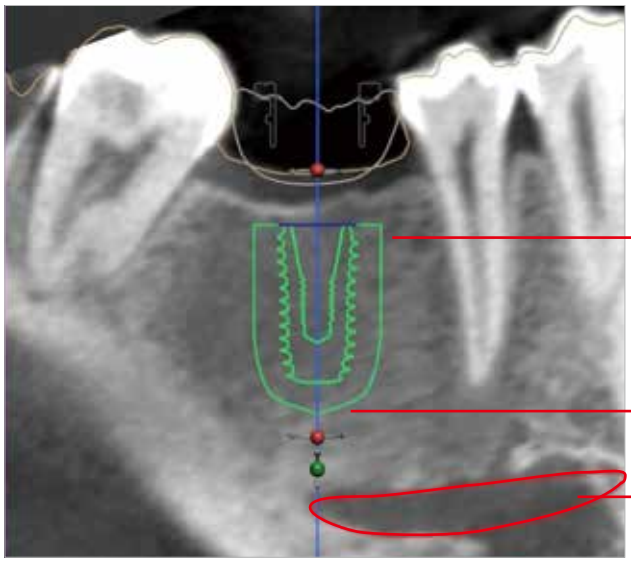
Ⓐ Scan-View : Check the correlation of the prosthesis
Ⓑ Fixture information on the corresponding dental formula
Ⓒ Panoramic view
Ⓓ Buccal-Lingual view
Ⓔ Mesial-Distal view



Sleeve

Virtual teeth

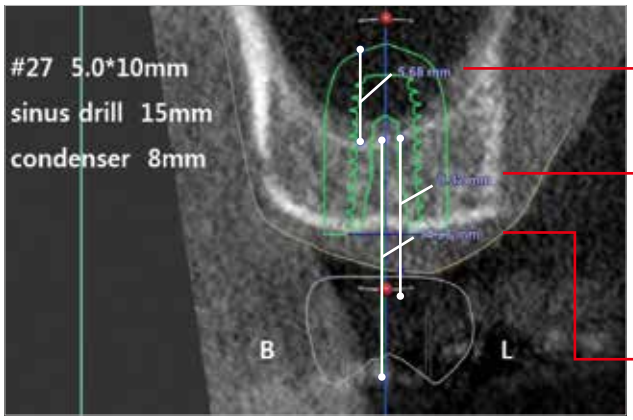
Scan line



Safety distance of the lateral area : 1.5mm

Safety distance of the bottom area : 2.0mm

Mandibular nerve



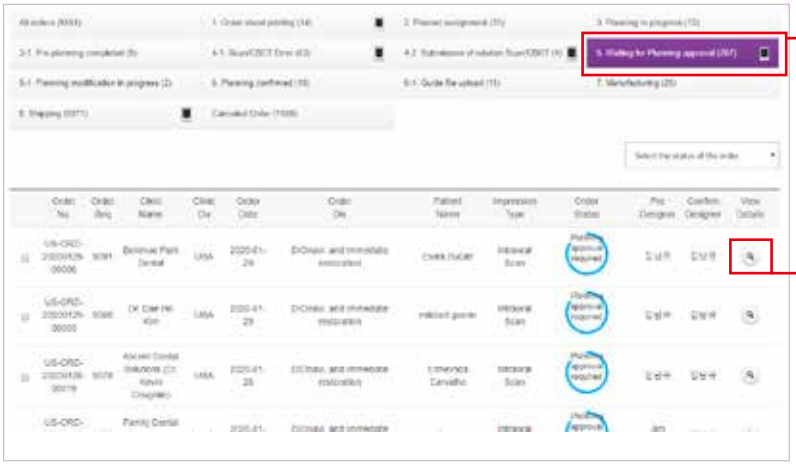
Height of sinus lift to be performed

Select relevant length of the stopper by using the length from the gum to the sinus wall and the length of the bone condenser measured when pushing of the bone while performing the bone graft.

Able to identify the length from sleeve top to sinus wall, length of the drill and the length of stopper in use.

Able to locate the implant and its surrounding anatomical information.
Density of the bone can be determined by making reference to the bone's white balance.

③ Planning confirm

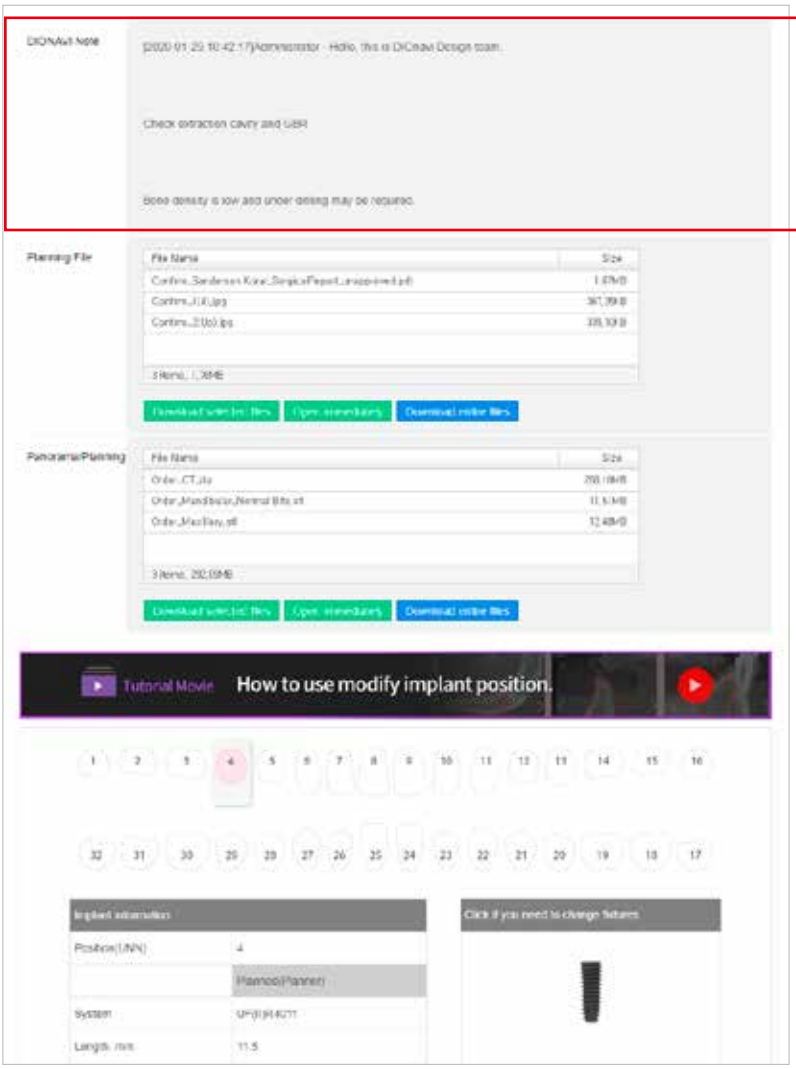


Await for planning confirmation

Your final confirmation on the file, planned by DIOnavi. Center, is required for us to continue the process.

Checking detailed contents

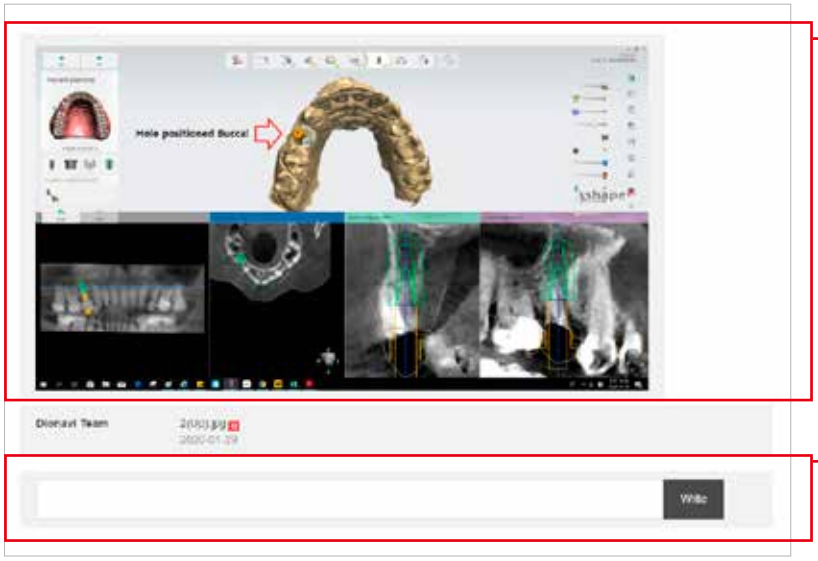
Click on the magnifying glass icon to check for any opinion or error examined by the DIOnavi. Team.



Checklist on planning confirmation

- Planning confirmation is possible on DIOnavi. website in which the DIOnavi. was ordered.

- Able to view the original opinion from the planning confirmation stage.



Click to enlarge image

Comment

Click on the registration button to submit an updated comments regarding initial modification.

Request for modification on the initial planning

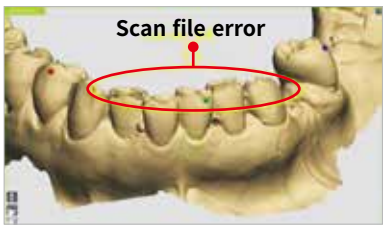
Click on request for modification with an updated comment on the amended review of the initial Planning.

Planning confirmation finalized

Click to confirm and proceed with the planning.

④ Surgical guide design

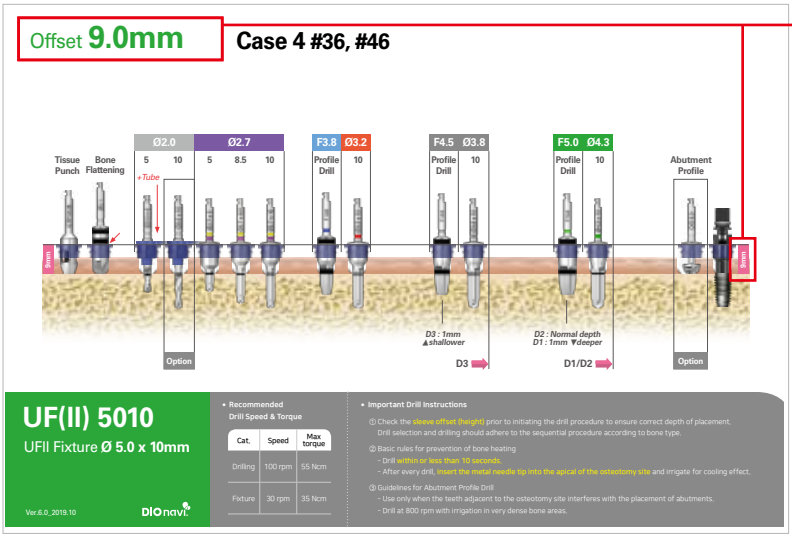
Surgical guide is designed on the basis of the scan data.



Caution Precise fitting of surgical guide can only be achieved by using accurate scan data.

Caution Guide may be misplaced If there is any error of the plaster model or the scan.

* Checklist upon receiving the DIOnavi. product and protocols



Implant information		
Implant position (FDI)	36	37
Manufacturer	DIO	DIO
Type	UF(II) 5010	UF(II) 5008
Order number	UF(II) 5010	UF(II) 5008
Length, mm	10	8.5
Diameter (Ø), mm	5	5
Color	Green	Green
Sleeve information		
Name	DIO GS 53	DIO GS 53
Type	Fully guided	Fully guided
Order number	GS 53	GS 53
Offset, (mm)	9	10.5
Drill information		
Minimum drill length	19	19

Check the drilling protocol offset

TIP Affix the report in the operating room to refer if necessary during surgery!

Confirm from the file uploaded on the DIOnavi. website

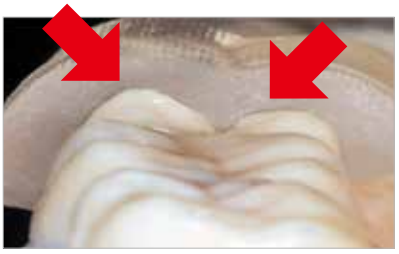
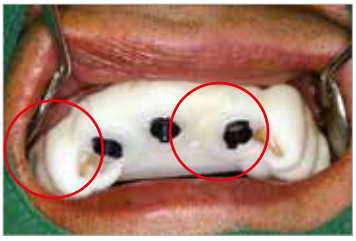
Surgical report.pdf (1.8MB)
Drilling protocol.pdf (204KB)

Surgical Process

1 Caution / Checklist for safe placement of DIOnavi. Guide

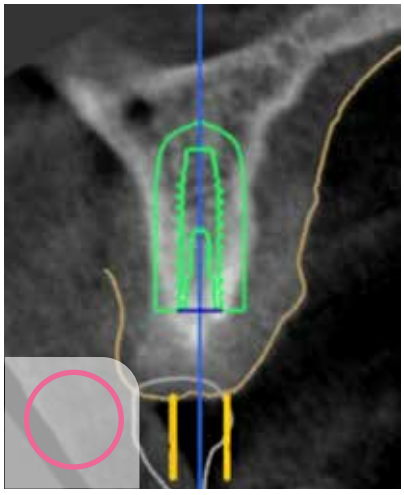
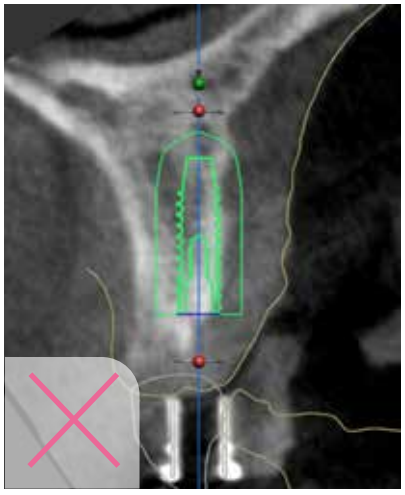
① Visual inspection of the surgical guide fitting

Check to determine whether the open Window of the guide and the neighboring teeth around the surgery area are compatible.

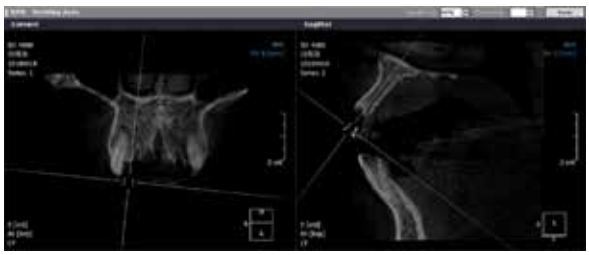
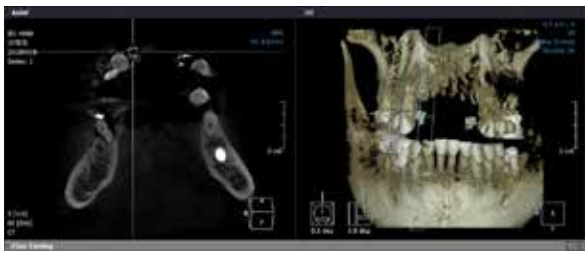
② Checking both position and direction of the sleeve in CT image

Check to see if the position and direction of the sleeve in the CT image match the planning.
※ Prior to operation we recommend to confirm the CT image and check if the guide is securely fastened.

③ Check the standard size information of the sleeve center in the CT image

Configurate sleeve center-based screen.

Check if the size in the CT match as planned, through the sleeve (Internal diameter and offset) drilling protocol and fixture size provided by DIO.

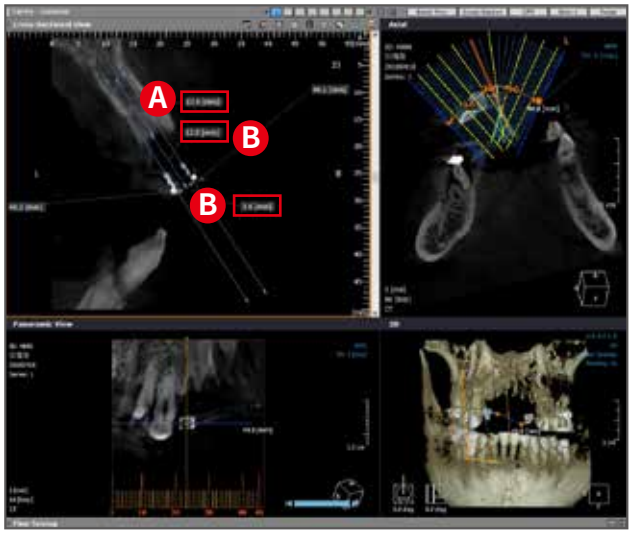
Implant information	
Implant position (FDI)	12
Manufacturer	DIO
Type (A)	UF(II)N 3313S
Order number (A)	UF(II)N 3313S
Length, mm	13
Diameter (Ø), mm	3.3
Color	Yellow
Sleeve information	
Name	DIO GS 36
Type	Fully guided
Order number (B)	GS 36
Offset, (mm) (B)	12
Drill information	
Minimum drill length	25

A Fixture size information

Length, Diameter

B Information on internal diameter of sleeve and the size of offset

- Size of the internal diameter of sleeve
- Offset size : Measure the size from the sleeve top area to the top surface of the bone



④ How to adjust fitting of DIOnavi. Guide

If any part of the guide cause clutch.

TIP Delete the marking area then secure with the check-bite which should be placed on the base of the guide.

TIP Since distortion can occur occasionally where the Arch rotates in the case of anterior teeth, or by metal prosthesis during intra oral scan, cut out the irrelevant part of the area to operation before joining.

2 DIOnavi. Surgical Kit Line-up

① DIOnavi. Kit configuration

DIOnavi. Master Kit

DIOnavi. Narrow Kit

DIOnavi. Wide Kit

DIOnavi. Flapless Crestal Sinus Kit

DIOnavi. Special Kit

DIOnavi. Protem Kit

② Surgical kit by surgical case

Sleeve size case Regular | Narrow | Wide

Regular

DIOnavi. Master Kit

[GS 53]

Narrow

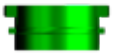
DIOnavi. Narrow Kit
DIOnavi. Protem Kit

[GSL 36]

[GS 36]

Wide

DIOnavi. Wide Kit



[GS 68GN]

Surgical case Sinus | Edentulous

Sinus case

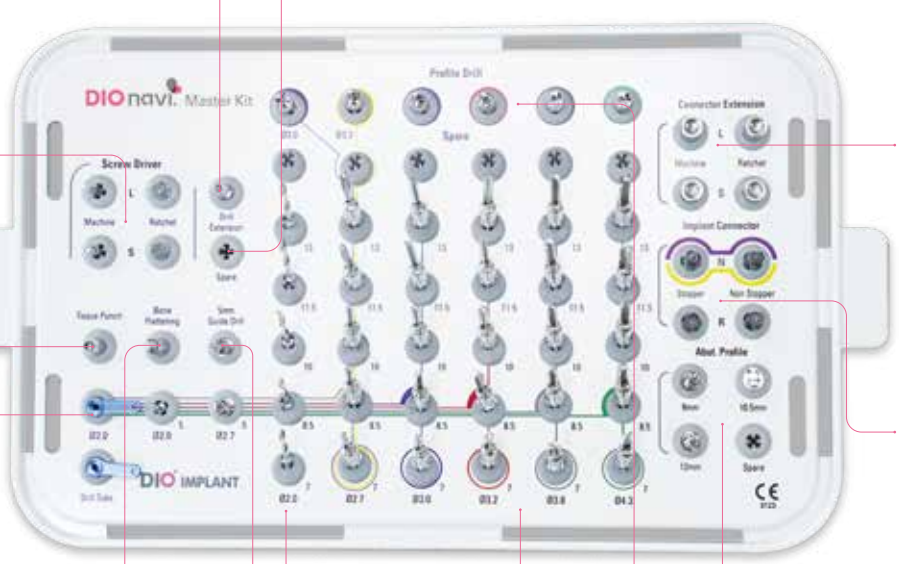
DIOnavi. Master Kit &
DIOnavi. Flapless crestal sinus Kit

Edentulous

DIOnavi. Master Kit &
DIOnavi. Special Kit

3 Surgical Kit Components

DIOnavi. Master Kit



Drill Extension
DE 3811

Screw Driver
MD 1222·MD1230·HD 1215A

Square Screw Driver
SHD 1215
SHD 1220

Connector Extension
CE 6512M·CE 6512A
CE 6508M·CE 6508A

Tissue Punch
GTP 5125

Implant Connector
GNIC 5309ST·GNIC 5309
GIC 5309ST·GIC 5309

Drill Tube
UDT 20
UDTE 20

Bone Flattening Drill
UBFD 5127M

Guide Drill
UGD 2005R

Initial Drill
ISD 2013M
ISD 2011M
ISD 2010M
ISD 2008M
ISD 2007M
ISD 2005M

Profile Drill
GPD 3005M
GPD 3305M
GPD 3805M
GPD 4005M
GPD 4505M
GPD 5005M

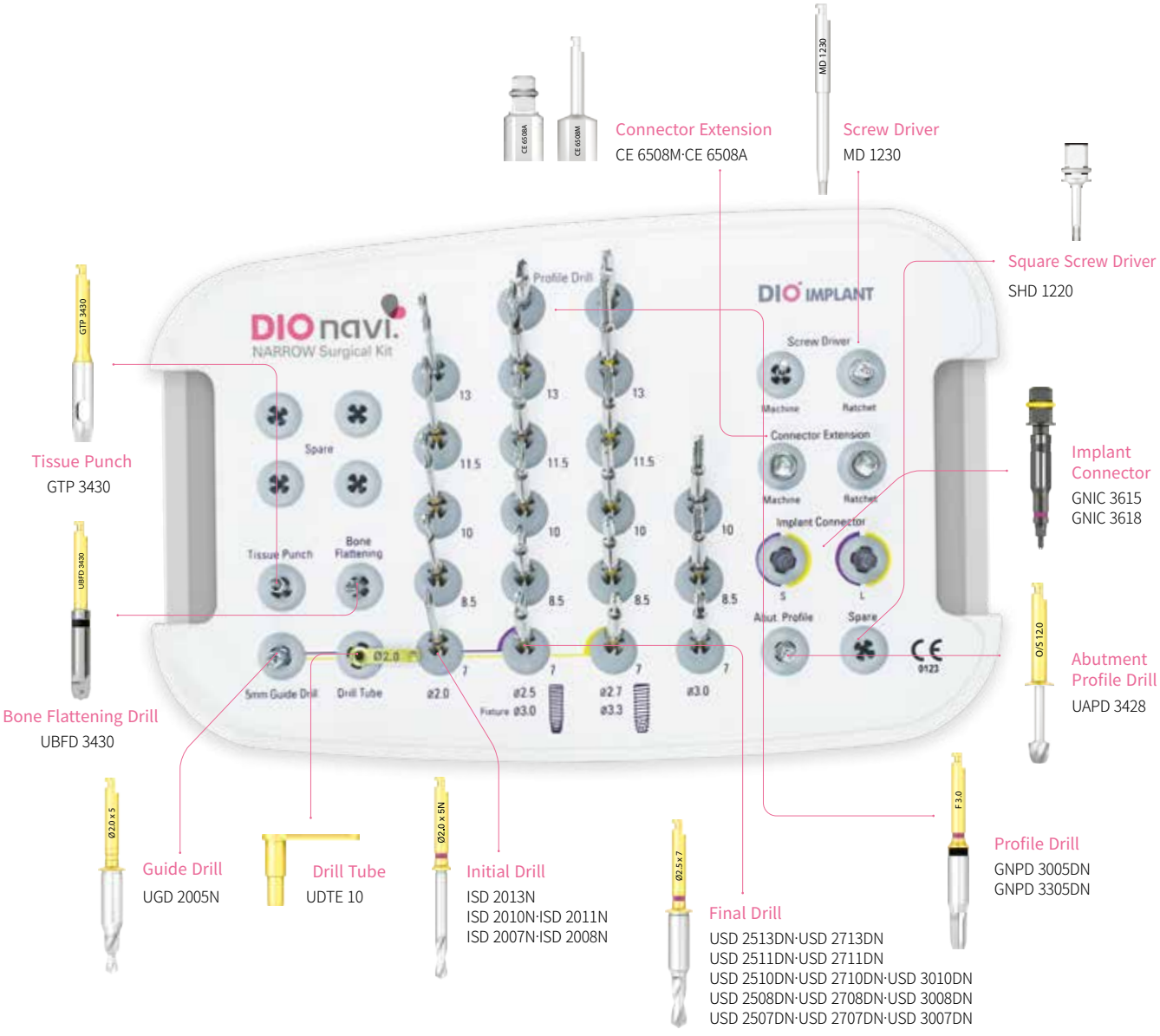
Abutment Profile Drill
UAPD 5123M
UAPD 5124M
UAPD 5126M

Final Drill

USD 2713M	USD 3013M	USD 3213M	USD 3813M	USD 4313M
USD 2711M	USD 3011M	USD 3211M	USD 3811M	USD 4311M
USD 2710M	USD 3010M	USD 3210M	USD 3810M	USD 4310M
USD 2708M	USD 3008M	USD 3208M	USD 3808M	USD 4308M
USD 2707M	USD 3007M	USD 3207M	USD 3807M	USD 4307M
USD 2705M				

Torque Wrench
DTW 0080

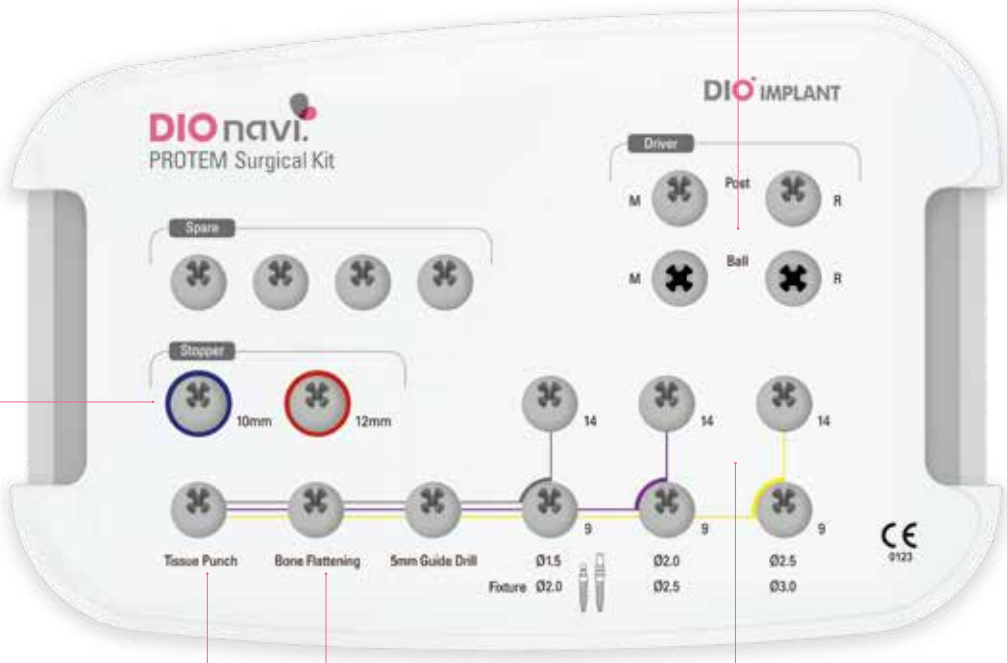
DIOnavi. Narrow Kit



Torque Wrench
DTW 0080

DIOnavi. Protem Kit

Fixture Driver
PBDH 3510 · PBDM 3510
PPDH 3510 · PPDM 3510



Stopper
PST 02 · PST 04

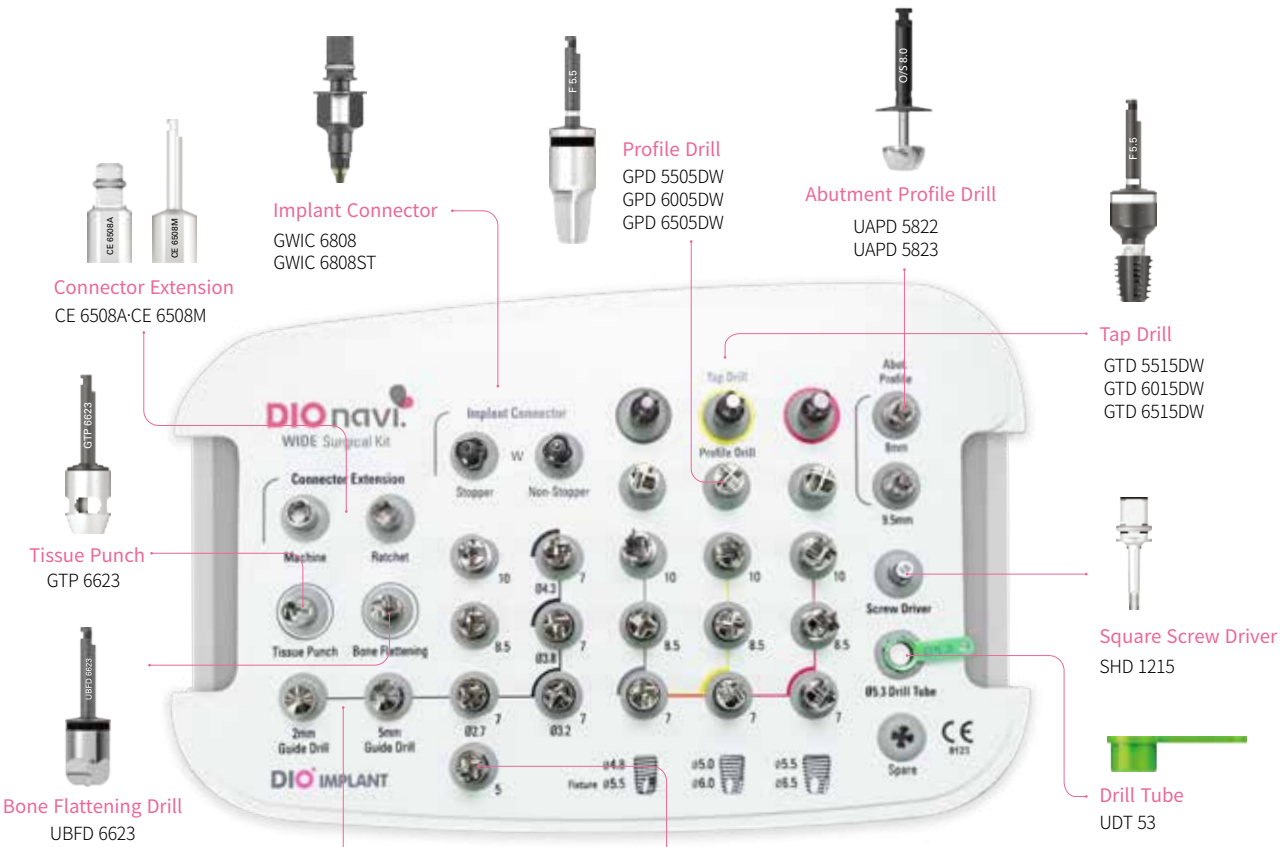
Tissue Punch
PTP 20

Bone Flattening Drill
UBFD 3430

Straight Drill
MSD 1505D · MSD 1509D · MSD 1514D
MSD 2009D · MSD 2014D
MSD 2509D · MSD 2514D

Torque Wrench
DTW 0080

DIOnavi. Wide Kit



Connector Extension
CE 6508A·CE 6508M

Implant Connector
GWIC 6808
GWIC 6808ST

Profile Drill
GPD 5505DW
GPD 6005DW
GPD 6505DW

Abutment Profile Drill
UAPD 5822
UAPD 5823

Tap Drill
GTD 5515DW
GTD 6015DW
GTD 6515DW

Tissue Punch
GTP 6623

Square Screw Driver
SHD 1215

Bone Flattening Drill
UBFD 6623

Drill Tube
UDT 53

Guide Drill
UGD 2002W
UGD 2005W

Final Drill
USD 2710DW·USD 4307DW·USD 4810DW·USD 5010DW·USD 5510DW
USD 2708DW·USD 3807DW·USD 4808DW·USD 5008DW·USD 5508DW
USD 2707DW·USD 3207DW·USD 4807DW·USD 5007DW·USD 5507DW
USD 2705DW

Torque Wrench
DTW 0080

① Tissue punch

Cut open the gum of the location where to be implanted and remove the gum tissues.

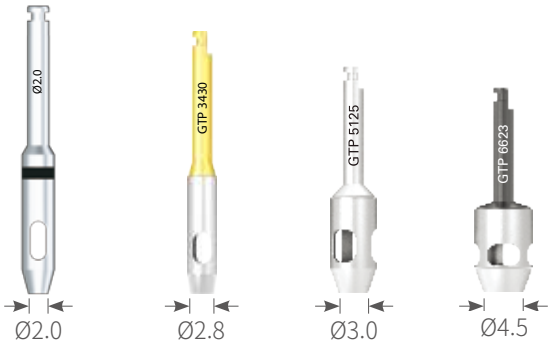
* Recommended rpm: 100 rpm

• Tissue punch smaller than the diameter of the implant is effective.

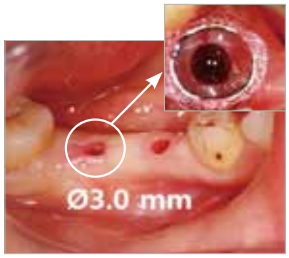
01 Hemostasis effect after the surgery through the contact between the mucous membrane and abutment surface

02 Healing of cut wound progresses rapidly

03 Healed leaving small scars



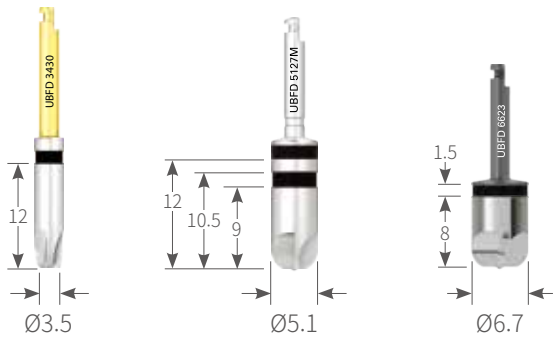
Protem [ISD 2010M] | Narrow [GTP 3430] | Regular [GTP 5125] | Wide [GTP 6623]



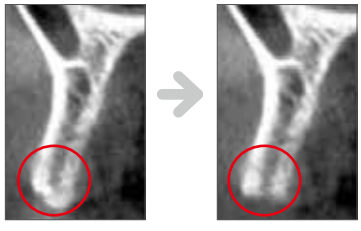
TIP It must be managed clean after every operation to prevent any rust occurring.
It can be removed easily using explore or steam.
Remove the residual gum with blade.

② Bone flattening drill

Make the alveolar crest bone surface flat.
(If the bone surface is not flat, drill will get slipped and will drill in the unintended direction.)
Remove the soft tissues remaining at alveolar crest after using tissue punch.
If the cortical layer is thick, use 100rpm while injecting water.



Narrow, Protem [UBFD 3430] | Regular [UBFD 5127M] | Wide [UBFD 6623]



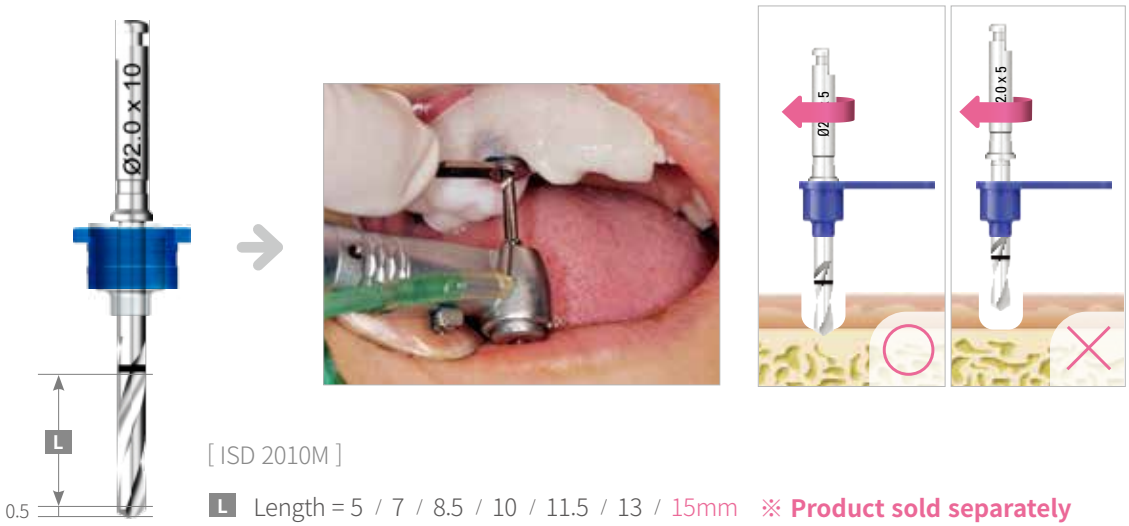
Before the use | After the use

③ Ø2.0 Initial drill

Secure the accurate position and direction of the initial drilling hole.

Using Drill tube, drill into 5mm then select the according drill for the fixture size.

* The drill will be much more securly fixated and give more precision in location and direction if used with the drill tube.
* Recommended rpm : 100 rpm without injecting water.



[ISD 2010M]

L Length = 5 / 7 / 8.5 / 10 / 11.5 / 13 / 15mm ※ **Product sold separately**

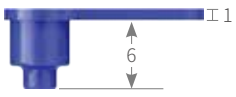
Caution The drill must pass through the drill tube and be safely palced onto the bone before the Drilling. If it enters as it rotates, drill can be stuck in the drill tube.

▸ Ø2.0 Drill tube

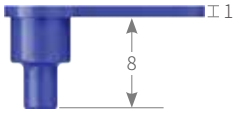
Drilling can be much more stablized by choosing relevant legnths for the sleeve offset and drill.

※ **Product sold separately**

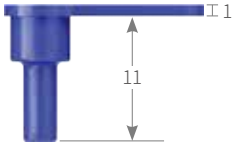
Regular



Standard size [UDT 20]

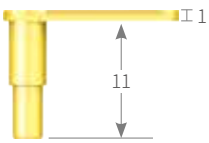


Extension size [UDTE 20]



Extension size [UDTL 20]

Narrow
Protem



Standard size [UDTE 10]

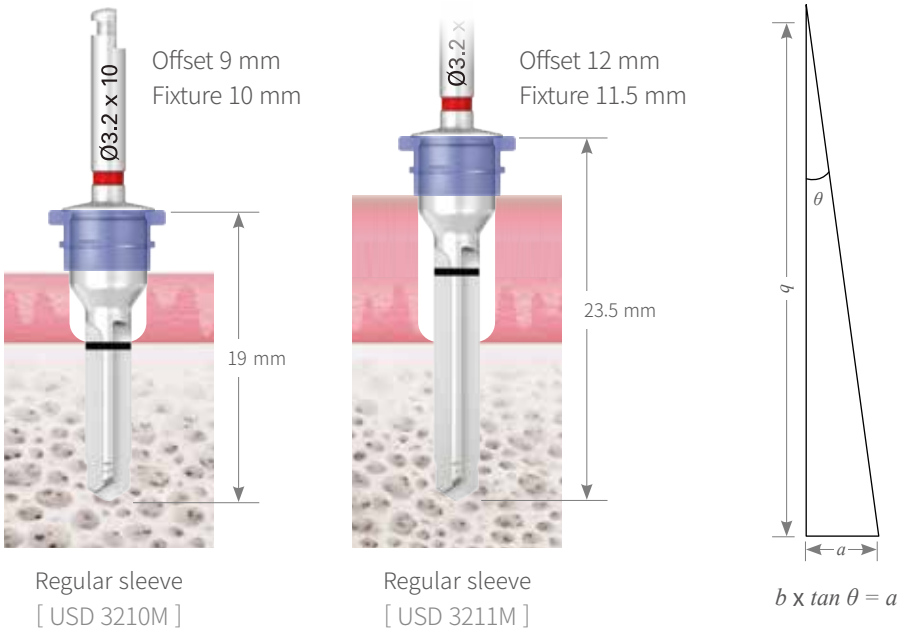
Wide

Extension size [UDT 53]

▸ Need for the drill tube

In the case of narrow width of the bone and in order to attach abutment produced in advance in the guided surgery, error range of less than 3° is required.
(Digital Flapless Implantology, Byeong-Ho Choi, 2015)

Reason why surgery error of more than 3° is dangerous?



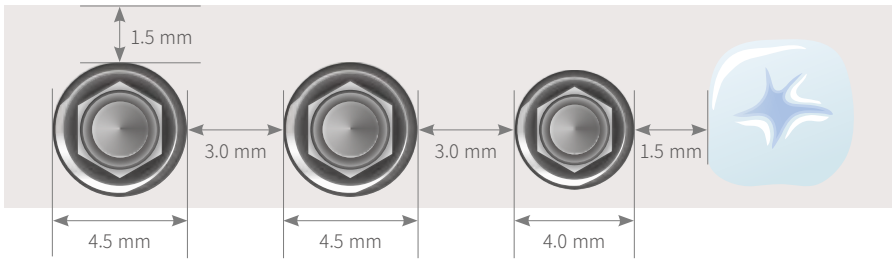
Regular sleeve
[USD 3210M]

Regular sleeve
[USD 3211M]

$b \times \tan\theta = a$

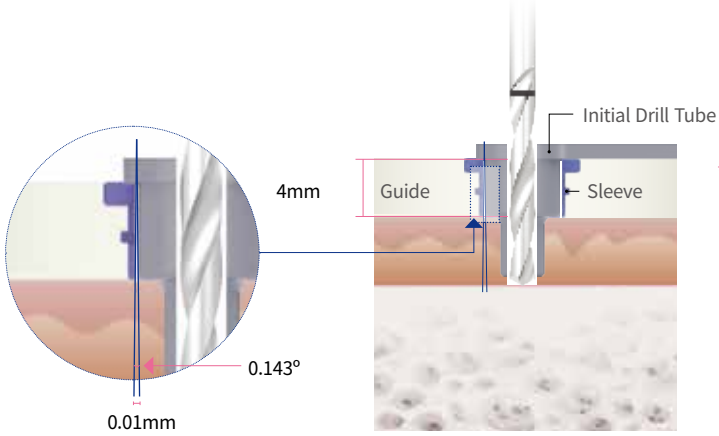
*** If it is 19 mm**
19 x tan3° = 1 mm
19 x tan5° = 1.7 mm

*** If it is 23.5 mm**
23.5 x tan3° = 1.2 mm
23.5 x tan5° = 2.1 mm



▸ It is more precise when drill tube is used

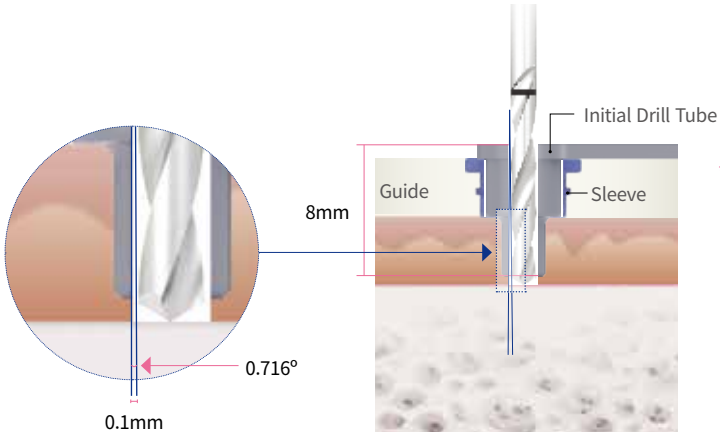
Accuracy of the initial drill determines the precision of the procedure.



* Error according to the tolerance between the drill tube and the sleeve

Gap between the drill tube and the sleeve = 0.01mm

Error in angle = 0.143°

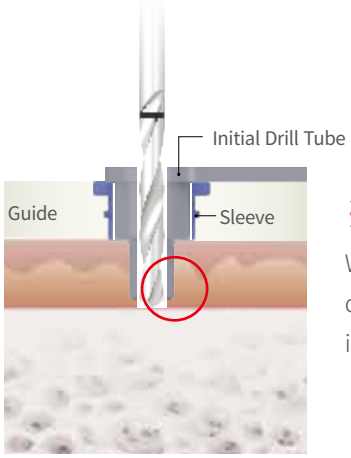


* Error according to the tolerance between the drill and the tube

Gap between the drill and the tube = 0.1mm

Error in angle = 0.716°

Max ① + ② ▶ 0.143 + 0.716 = 0.859°



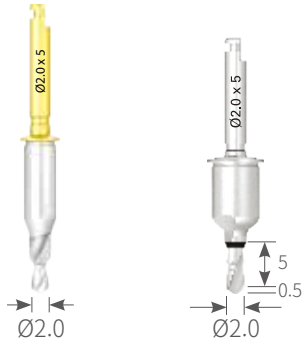
※

With the design in which the drill tube enters deep into the soft tissue, it can reduce error in initial drilling.

④ Ø2.0 Guide drill

If the opening is small, only 5mm initial drilling without drill tube can be used.
(If for wide, there are 2 options of 2mm and 5mm)

* Use only if the opening is small
* Recommended rpm : 100 rpm



Narrow
[UGD 2005N]

Regular
[UGD 2005R]

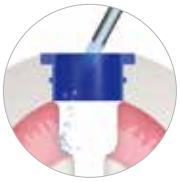
Wide
[UGD 2002W]
[UGD 2005W]

Drill stably after the drill is fixated in contact with the inner surface of the guide sleeve.

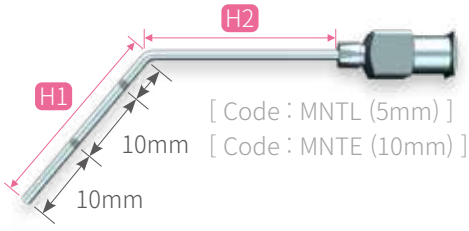
▸ Irrigation

It can prevent bone heating and cleanly remove particles within the bone cavity if it is placed to the depth of the bone cavity using metal needle.

O
Needle is placed to the depth of the bone cavity and water is injected.



X
Since the needle is not positioned deep, it is difficult to inject water into the bone.

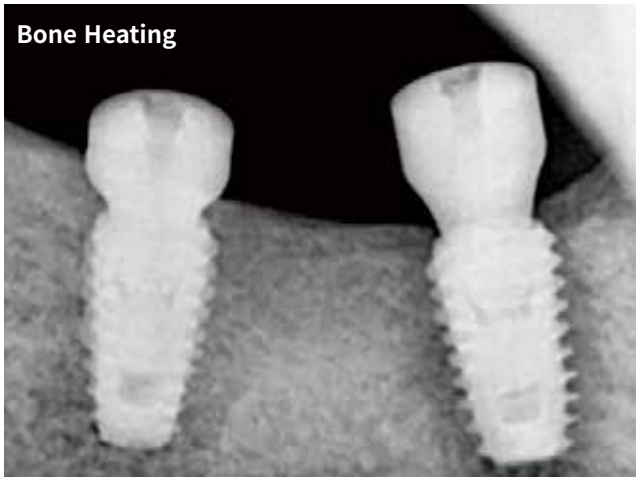


[Code : MNTL (5mm)]
[Code : MNTE (10mm)]

Code	H1	H2
MNTE	30	50
MNTL	25	25

*** Recommended syringe specifications**
30~50cc (Store in refrigerator prior to the procedure)

▸ Recommendations for the drill stage



Repetitive cleaning of the drilling hole and suction at each drilling stage is recommended.

Although not injecting water is the principle in drilling at low speed of less than 100 rpm, repetitive cleaning of the drilling hole and suction even for the bone cavity at each drilling stage is recommended in order to prevent bone heating and remove particles within the bone cavity.

TIP 10-second drilling rule!

When drilling at low speed in the case with high bone density, the drilling time will increase the risk of bone heating. Accordingly, the drilling should not exceed 10 seconds.

If time gets longer, drill for less than 10 seconds and remove the drill before re-drilling after injecting water to the bone cavity.

⑤ Final drill

Drill body and the guide sleeve will be fixed onto each other without the drill tube and use the drill relevant to the fixture size.

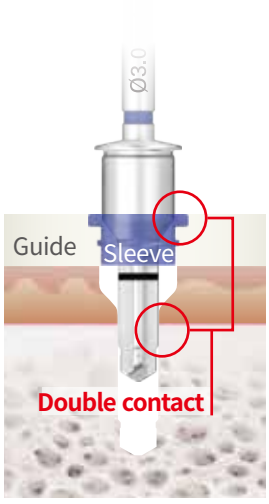
* 15mm drill can be purchased separately or is basically composed in the case of special kit.
* Recommended rpm : 100 rpm

Protem
[MSD 2509D]

Narrow
[USD 2508DN]

Regular
[USD 4310M]

Wide
[USD 3205DW]



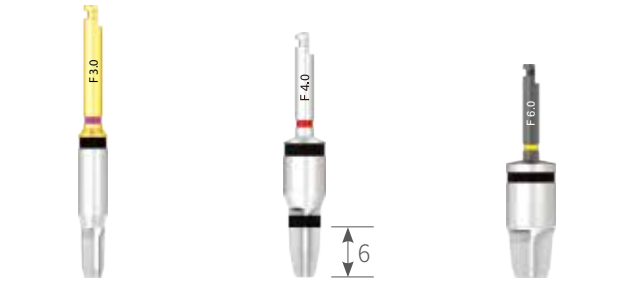
Caution It can prevent slipping, etc. if drill with short length is used since double contact appears when drill body and sleeve are placed in the drilling hole.

⑥ Profile drill

Prevent excessive torque in embedding fixture by expanding the cortical bone in the D1 or D2 mandibular bone.

In addition, it is helpful that bone is flattened and drill enters stably.

* Recommended rpm : 100 rpm



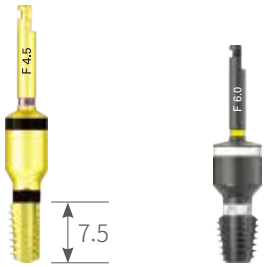
Narrow [GNPD 3005DN] | Regular [GPD 4005M] | Wide [GPD 6005DW]

⑦ Tap drill

Prevent excessive torque in embedding fixture.

* Recommended rpm : 50 rpm

※ **Product sold separately**



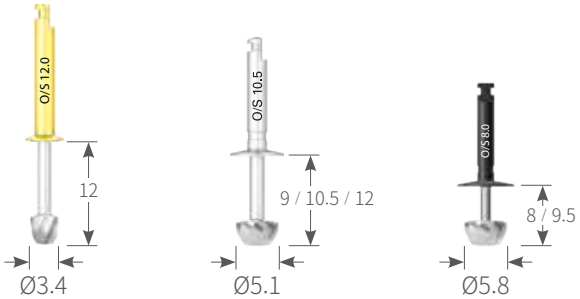
Regular [GTD 4515] | Wide [GTD 6015DW]

⑧ Abutment profile drill

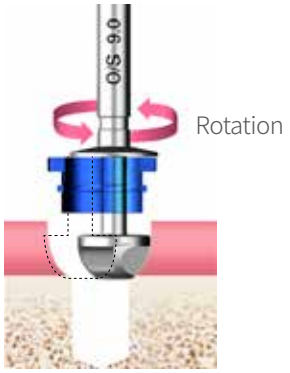
Remove alveolar bone which interfere when binding abutment or H-Scanbody.

Form abutment profile by rotating the drill along the internal sleeve.

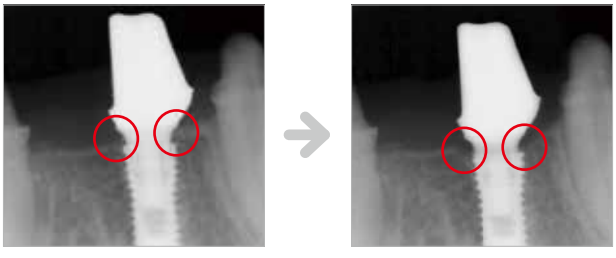
* Recommended rpm : 800 rpm



Narrow [UAPD 3428] | Regular [UAPD 5124M] | Wide [UAPD 5822]



*** Abutment profile drill**

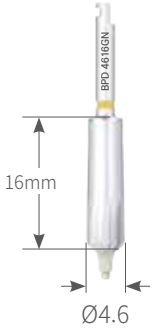


Before the use | After the use

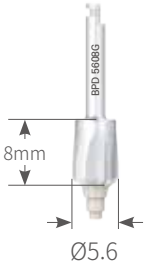
* Bone profile drill ※ Product sold separately

Cover screw will firstly be removed then the neighboring bone to the Fixture,
at the 2nd operation making fastening of the abutment (Healing) easier.

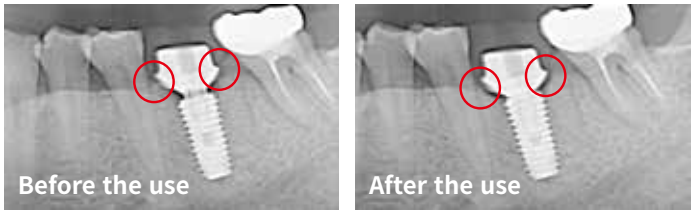
* Recommended rpm : 100 rpm



Narrow
[BPD 4616GN]



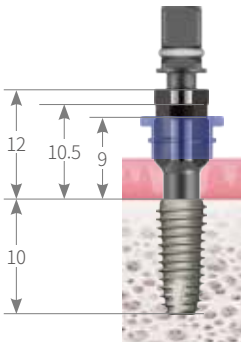
Regular
[BPD 5608G]



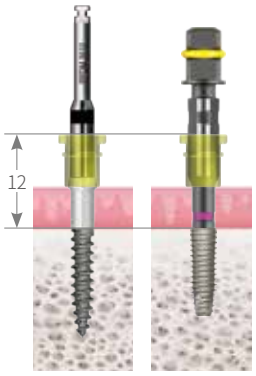
Bone profile drill

⑨ Implant connector

Safely tow the fixture to the guide sleeve for implantation.
Match the depth of sleeve offset and implant connector.

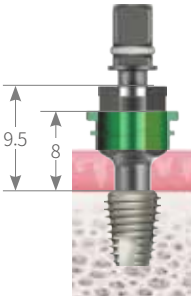


Regular



Protem Narrow

Caution When binding the customized abutment manufactured in advance, both the depth and direction of the implant connector and sleeve must be matched.



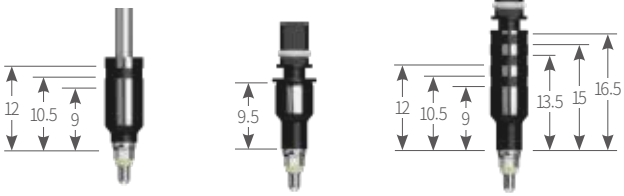
Wide

TIP If the implant connector is stuck in the sleeve, remove it on the principle of levers by inserting the crown remover into the groove.

K UFII **Regular**

2.5 Hex

※ Product sold separately



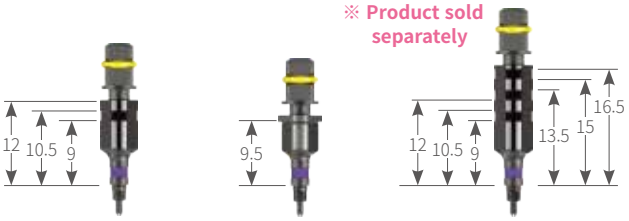
Non-Stopper [GIC 5309] | Stopper [GIC 5309ST] | Multi [GIC 5317] | Machine non-Stopper [GICC 5309]

K UFII **Narrow**

1.7 Hex

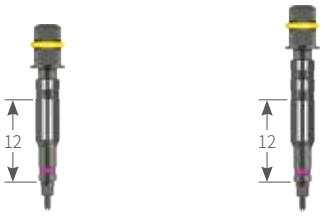
Master Kit

※ Product sold separately



Non-Stopper [GNIC 5309] | Stopper [GNIC 5309ST] | Multi [GNIC 5317] | Machine non-Stopper [GNICC 5309]

Narrow Kit



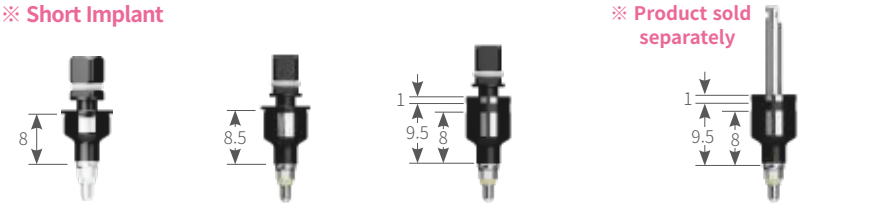
Non-Stopper (Short) [GNIC 3615] | Non-Stopper (Long) [GNIC 3618]

K UFII **Wide**

2.5 Hex

※ Short Implant

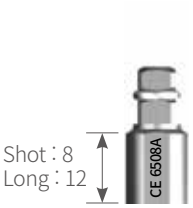
※ Product sold separately



Stopper [GWIC 6807ST] | Stopper [GWIC 6808ST] | Non-Stopper [GWIC 6808] | Machine non-Stopper [GWICC 6808]

⑩ Connector extension

Embed the fixture with ratchet and hand piece by extending the implant connector.



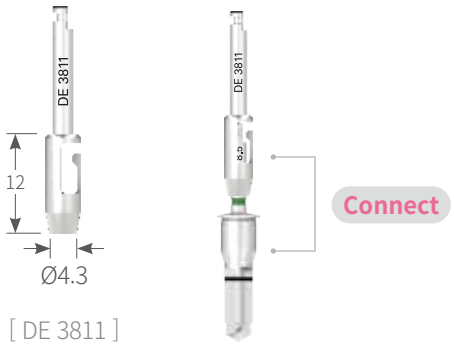
Ratchet [CE 6508A]

Machine [CE 6508M]

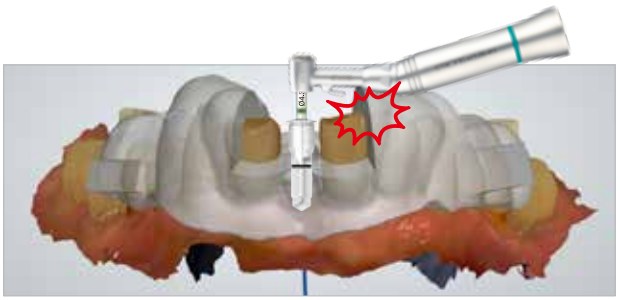
Common use — Narrow / Regular / Wide

⑪ Drill extension

Extend the drill before drilling using hand-piece.



[DE 3811]



Caution If the hand piece gets caught by the neighboring tooth, it is necessary to use drill extension or to remove neighboring tooth.

⑫ Torque wrench

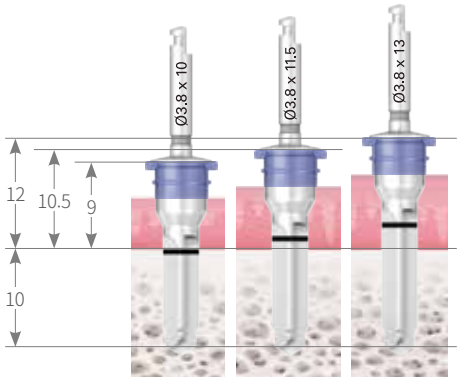
It is used in embedding fixture using implant connector.

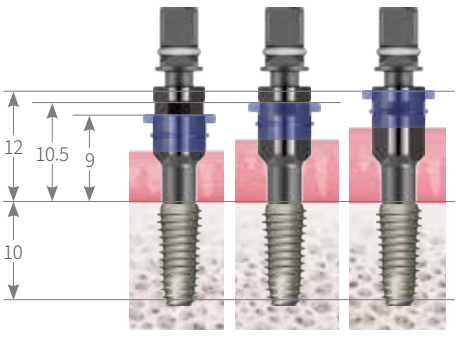
[DTW 0080]

Understanding of offset

▸ Use of sleeve offset and the product

① Regular





How to select drill according to the sleeve offset (10mm drill as the reference)

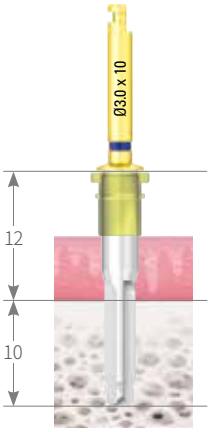
In the case of offset 9mm	Drill 10mm
In the case of offset 10.5mm	Drill 11.5mm
In the case of offset 12mm	Drill 13mm

Standard height of implant connector according to the sleeve offset (For 10mm fixture)

In the case of offset 9mm	Up to the first scale marking
In the case of offset 10.5mm	Up to the second scale marking
In the case of offset 12mm	Up to the third scale marking

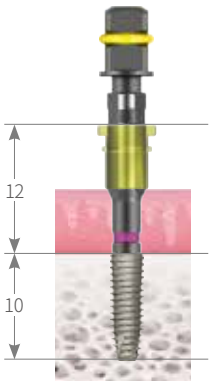
Caution Both the depth and direction of the implant connector and sleeve must match when binding the customized abutment manufactured in advance.

② Narrow



How to select drill according to the sleeve offset (10mm drill as the reference)

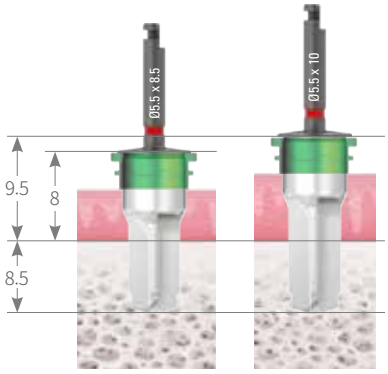
In the case of offset 12mm → Drill 10mm



Standard height of implant connector according to the sleeve offset (For 10mm fixture)

In the case of offset 12mm → Up to the first scale marking

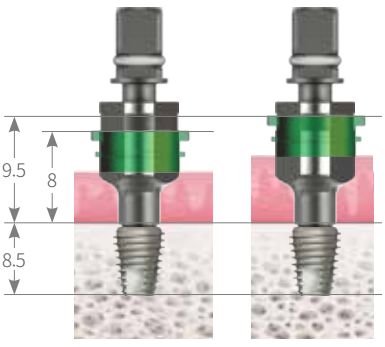
③ Wide



How to select drill according to the sleeve offset (8.5mm drill as the reference)

In the case of offset 8mm → Drill 8.5mm

In the case of offset 9.5mm → Drill 10mm

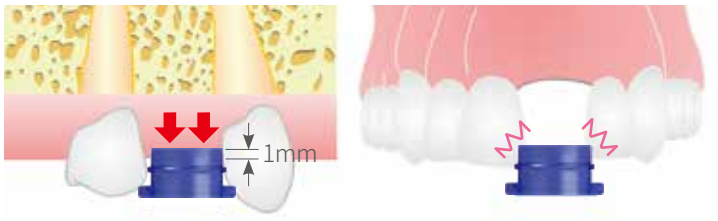


Standard height of implant connector according to the sleeve offset (For 8.5mm fixture)

In the case of offset 8mm → Up to the first scale marking

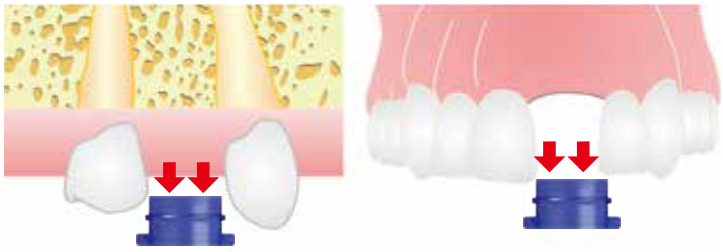
In the case of offset 9.5mm → Up to the second scale marking

▸ When applying sleeve offset

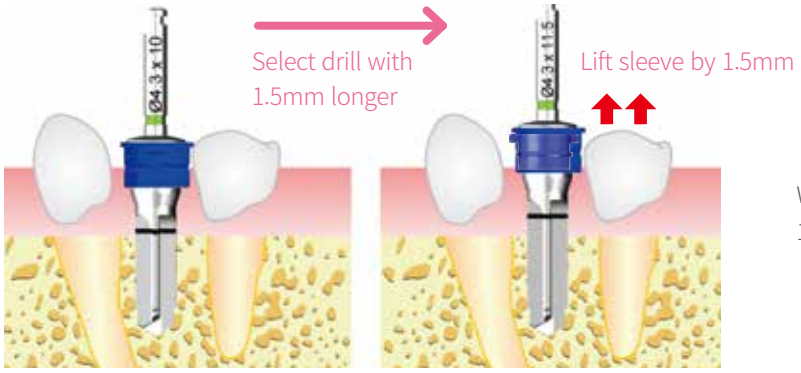


It can be placed inside the gum

- Remove the neighboring tooth when tightening the guide will cause interference in entering the sleeve due to the narrow gap between adjacent teeth.
- If the gum is thick, it is possible to plan the sleeve to enter into the gum by about 1mm.



Lift up the sleeve by 1.5mm / 3mm.



When embedding 10mm implant, select 11.5mm Drill if the sleeve offset is 10.5.

DIOnavi. Flapless Crestal Sinus Kit

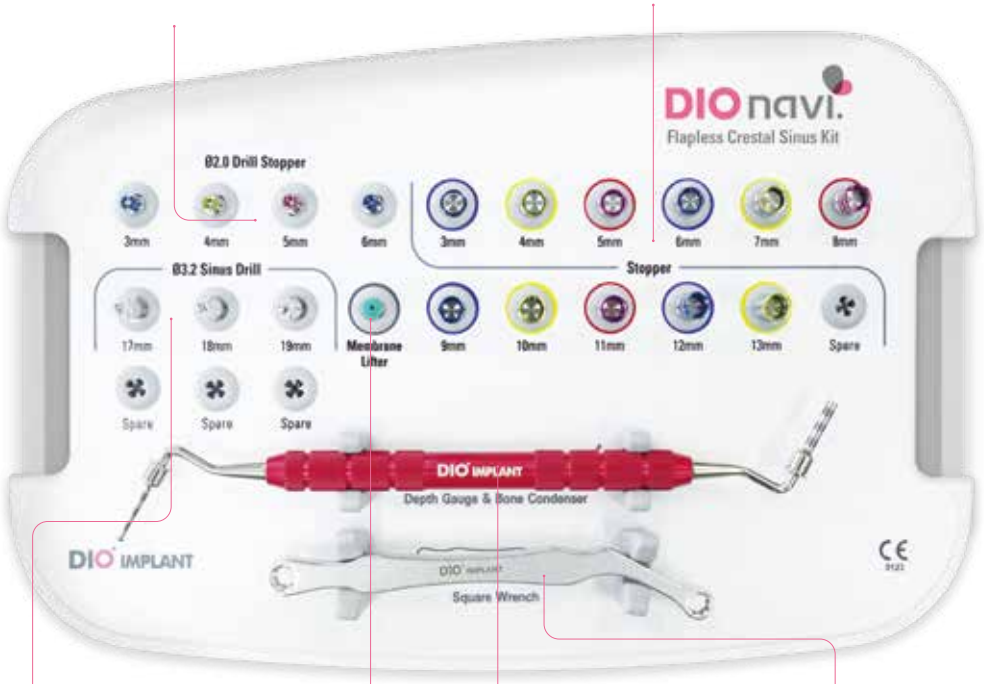
Ø3.2 Drill Stopper

GST 03BL GST 04YE GST 05RD GST 06BL GST 07YE GST 08RD

GST 09BL GST 10YE GST 11RD GST 12BL GST 13YE

Ø2.0 Drill Stopper

GST 2030BL GST 2040YE GST 2050RD GST 2060BL



Sinus Drill

GSRD 3217
GSRD 3218
GSRD 3219

Membrane Lifter

WML 6627

Square Wrench

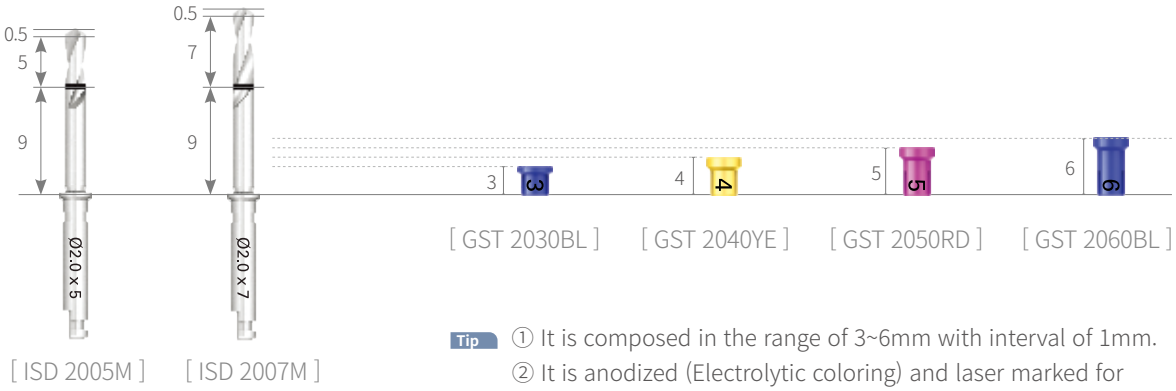
DSW 050

Depth Gauge & Bone Condenser

GSDB 2619

① Stopper for exclusive use of Ø2.0 Drill

Install on Ø2.0 initial drill (DIOnavi. Master Kit) and stably drill to the desired depth.



[ISD 2005M] [ISD 2007M]

Tip ① It is composed in the range of 3~6mm with interval of 1mm.
② It is anodized (Electrolytic coloring) and laser marked for each depth.

② Sinus drill (For crestal) & Stopper

Front blade with round shape drills by approaching the sinus without damaging the membrane.

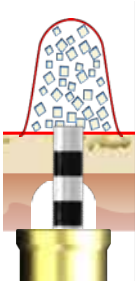
* Low speed drilling without injecting water (10 rpm)

Ⓐ [GSRD 3217] Ⓒ [GSRD 3219]
Ⓑ [GSRD 3218] Ⓓ [GSRD 3221] ※ **Product sold separately**

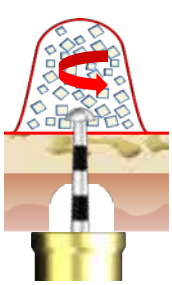
Tip ① Use it attached to the straight drill (DIOnavi. Master Kit), Sinus drill, Depth gauge & Bone condenser.
② It is composed of 11 items in the range of 3~13mm with interval of 1mm.
③ The height of stopper signifies the depth.

③ Depth gauge & Bone condenser

After checking the thickness of the residual bone and whether the membrane is lifted, push in the bone into the lifted sinus.

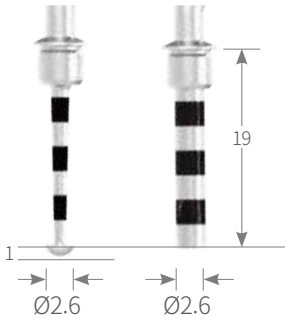


19mm -(H+1)
Bone condenser

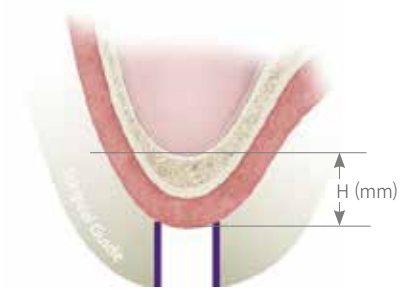


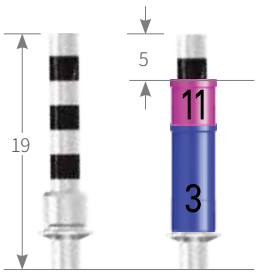
19mm -(H+2)
Depth gauge

Tip After separating the guide, make sure to use it attaching the stopper.



[GSDB 2619]





Tip If the H value is less than 5mm, 2 Stoppers must be combined.

④ Membrane lifter

Inject 0.6cc slowly in single case in the hydraulic way using saline solution.

Tip
① Prohibit use in patient with inflammation in the maxillary sinus membrane.
② Prohibit use in cases with complicated morphological configuration of Sinus floor (Septum, etc.).
③ Use saline solution or patient's blood.
④ Use while the guide is bound.

Caution Use after autoclaving it prior to the surgery and use the Lift tube only once since cross-contamination can occur.

⑤ Square wrench

Place and fixate the membrane lifter in the drilling hole.

⑥ Syringe & Tube

Syringe ※ Product sold separately

It must be a needleless syringe with capacity of 5ml / cc
with clear scale for 0.2ml / cc.

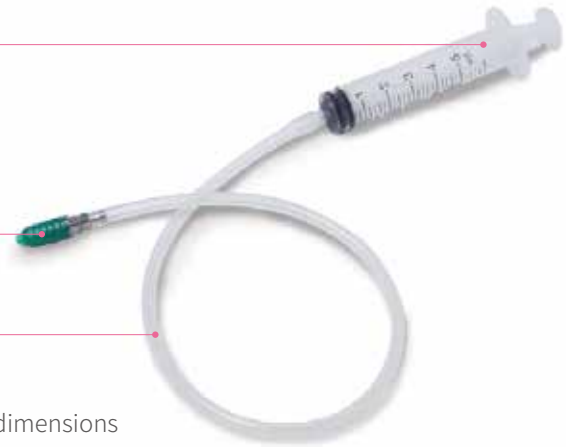
* Disposable sterilized medical device.

Membrane lifter

Tube ※ Product sold separately

[MLT 40300]

It is a tube made of semi-transparent silicon material with dimensions
of external diameter of Ø4.0 / internal diameter Ø2.0 and length of 300mm.

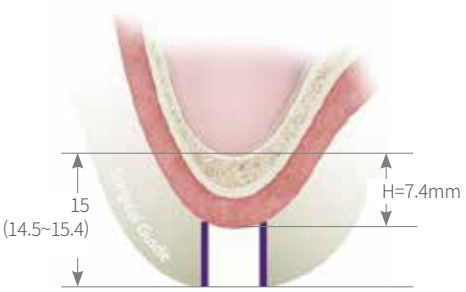


Tip
① After the primary packaging with sterilized sheet, the user manual is included in the secondary packaging.
② Customer will open the secondary packaging.
③ Use by executing autoclaving while the product is in the primary (Sterilized sheet) packaging.

Caution Use only once since cross-contamination can occur.

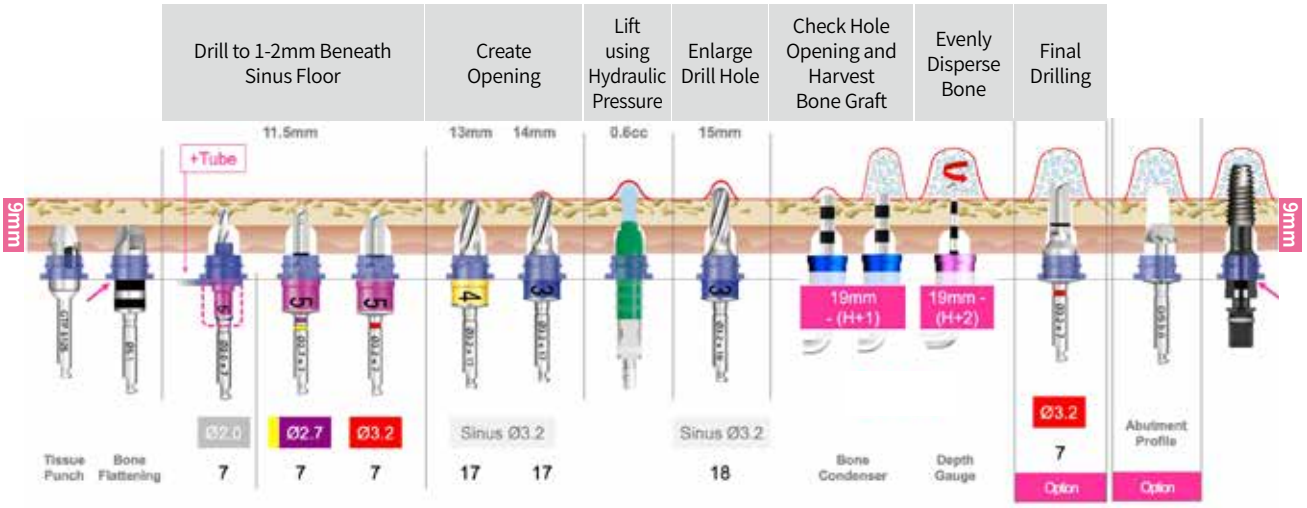
⑦ Drilling protocol

ex) Ø5.0 x 10mm Offset 9mm



*** Recommended drilling speed & Torque value**

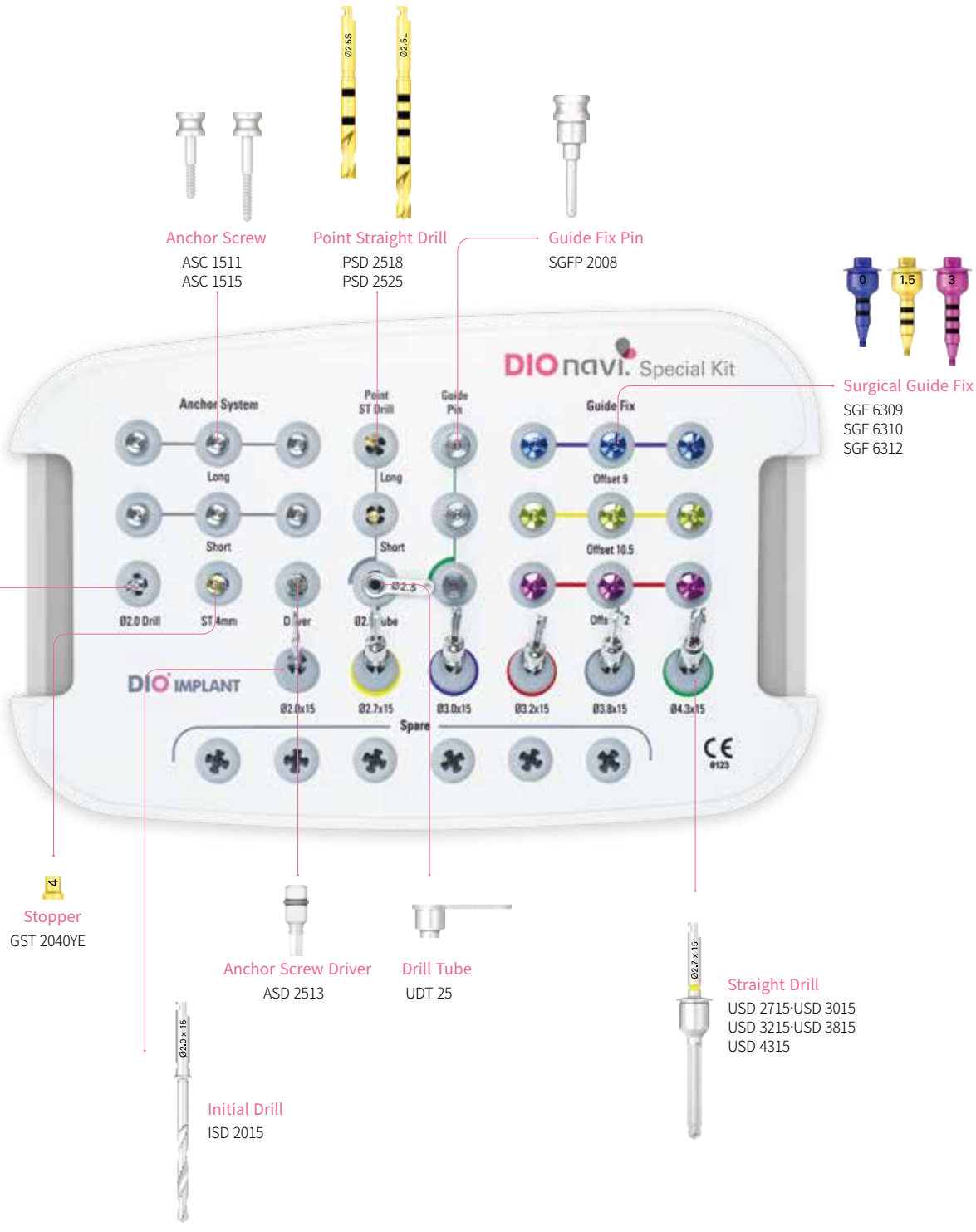
Cat.	Speed	Max torque
Drilling	100 rpm	55 Ncm
Sinus drill	10 rpm	35 Ncm
Fixture	30 rpm	35 Ncm



Stopper	5mm	5mm	5mm	4mm	3mm	Hydraulic lifting	3mm	H+1	H+2	-	-
Drill length	7mm	7mm	7mm	17mm	17mm		18mm	19mm -(H+1)	19mm -(H+2)	7mm	-
Ref	Ø2.0 Initial drill	Ø2.7 Straight drill	Ø3.2 Straight drill	Ø3.2 Sinus drill	Ø3.2 Sinus drill		Ø3.2 Sinus drill	Bone condenser	Depth gauge	Ø3.2 Straight drill	Abutment profile drill
								After Seperate Guide			

Caution Use abutment profile drill if the residual bone is more than 6mm.
It is recommended that fixture with more than 4.5 is embedded for sinus case.

DIOnavi. Special Kit



Anchor Screw
ASC 1511
ASC 1515

Point Straight Drill
PSD 2518
PSD 2525

Guide Fix Pin
SGFP 2008

Surgical Guide Fix
SGF 6309
SGF 6310
SGF 6312

Anchor Drill
AD 2015

Stopper
GST 2040YE

Anchor Screw Driver
ASD 2513

Drill Tube
UDT 25

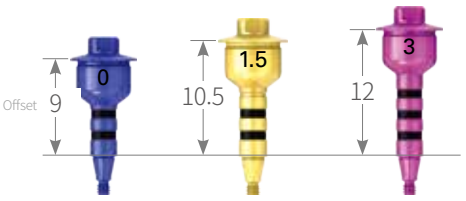
Straight Drill
USD 2715·USD 3015
USD 3215·USD 3815
USD 4315

Initial Drill
ISD 2015

① Surgical guide fix & Fix pin

Fixate the surgical guide by binding it on to the drilling hole or embedded fixture first to prevent moving.

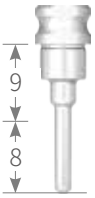
* Fix (Fixture + Surgical guide)



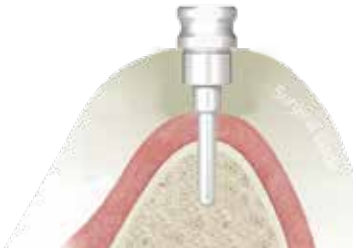
[SGF 6309] [SGF 6310] [SGF 6312]

Caution Make sure to fasten the sleeve offset with the according fixture.

* Fix pin (Ø2.0 Drill hole + Surgical guide)



[SGFP 2008]

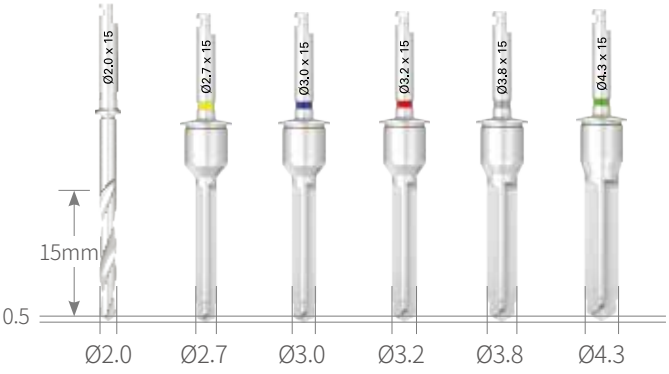


TIP Using bone flattening drill is recommended to reduce the interference of the gum and use for drilling of more than Ø2.0 x 8.5㎜ regardless of the sleeve offset.

② Initial drill & Straight drill

Use when embedding offset of more than 12mm and fixture of more than 13mm.

* Recommended rpm : 100 rpm



*** Initial drill**

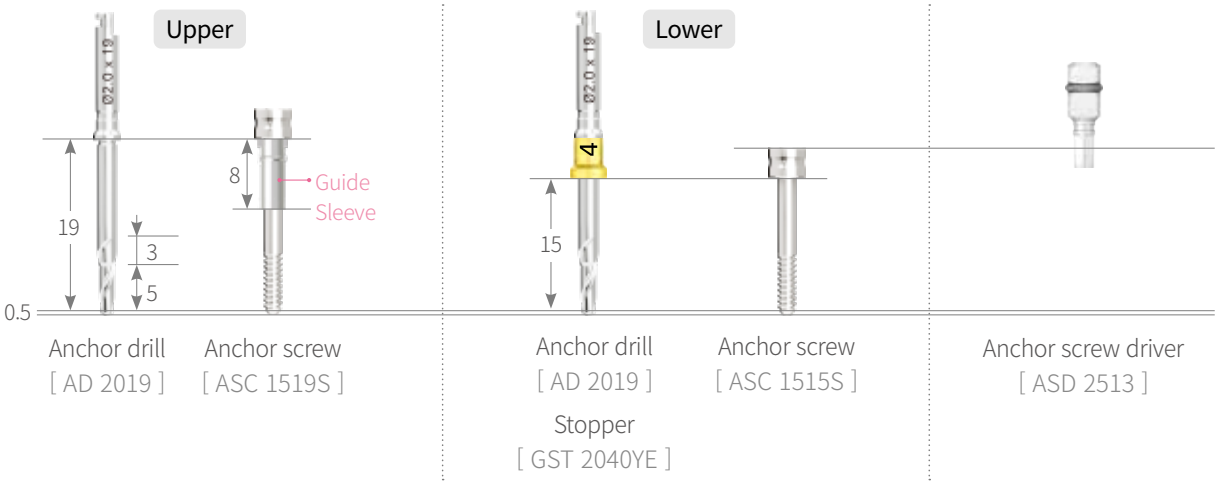
Ø2.0 [ISD 2015]

*** Straight drill**

Ø2.7 [USD 2715]
Ø3.0 [USD 3015]
Ø3.2 [USD 3215]
Ø3.8 [USD 3815]
Ø4.3 [USD 4315]

③ Anchor drill & Anchor screw

Fixate the anchor screw after drilling outside the surgical guide.



TIP In the case of mandible, make sure to use 4mm stopper and exclusive anchor screw.

Caution When binding anchor screw.

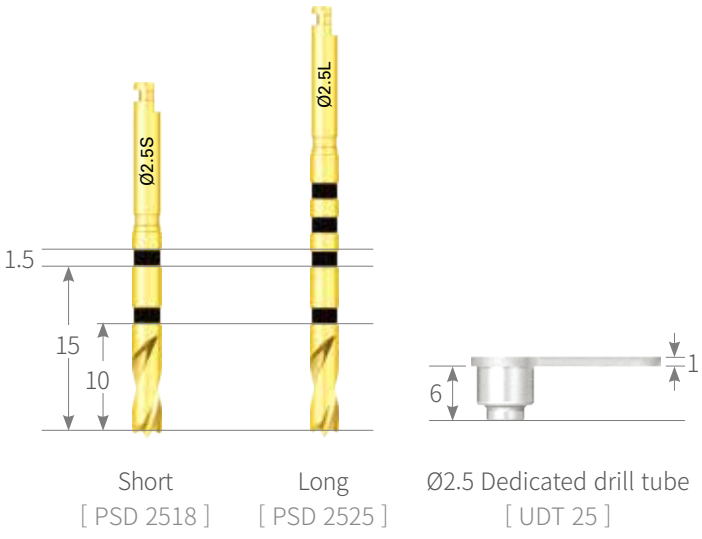
① Bind with hand.

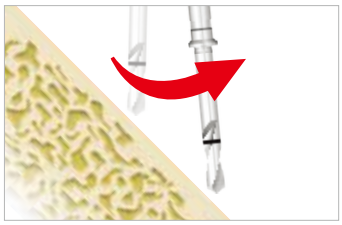
② Make sure to bind several holes simultaneously since the guide can become crooked if it is bound 100% for 1 hole and then other holes successively.

③ To prevent gum from causing misplacement, push carefully through.

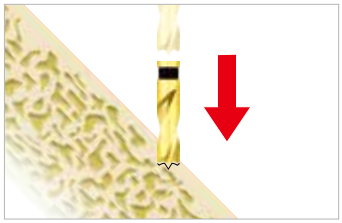
④ Ø2.5 point straight drill

It is a specialized drill to form guide hole accuratly and to prevent slipping on bone with severe inclination.





Ordinary drill can cause slipping.



Stable drilling when point straight drill is used.

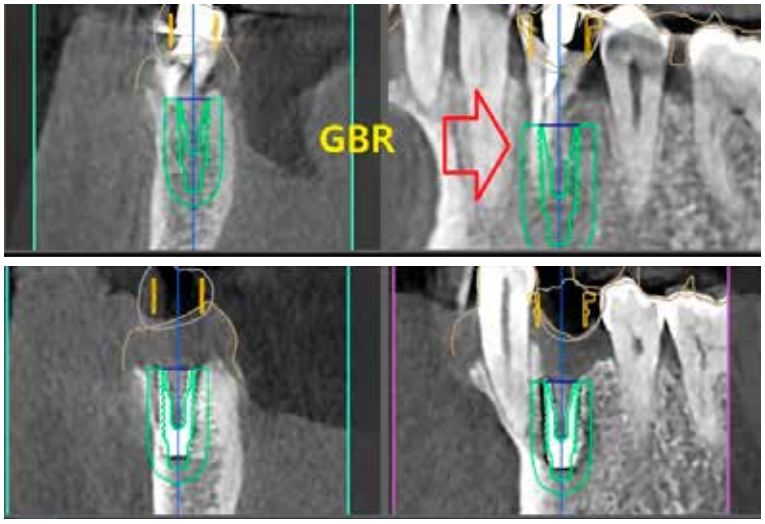
Caution Make sure to use it after attaching the exclusive drill tube.

TIP

How to use surgical tools for each type of surgery

1 Case of extraction immediately after

In the event of extracting tooth on the day of the procedure + DIOnavi. Master Kit



Drill can slip immediately after tooth extraction and in the section where the extraction window area has not yet fully healed.

▸ Solution ①

Drill stably to the desired depth attached in Ø2.0 initial drill. (DIOnavi. Master Kit)

[ISD 2005M] [ISD 2007M] [ISD 2010M]

Ø2.0 initial drill attached with drill tube can drill accurately with stable chucking power and can minimize the error range that can occur using it sequentially from short drills.

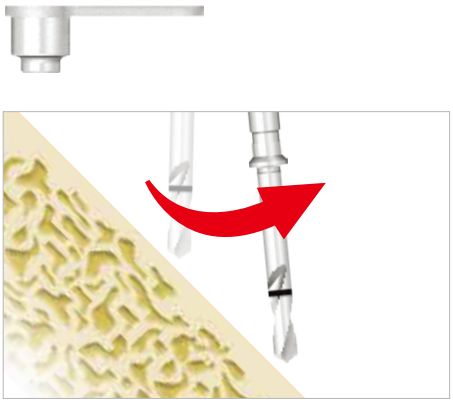
[USD 2705] [USD 2707] [USD 2710]

Ø2.7 Drill can secure chucking force in the guide sleeve from the shorter lengths.

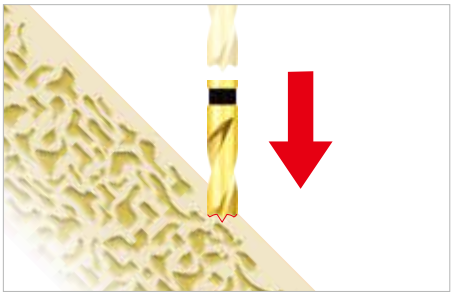
▸ Solution ②

Ø2.5 point straight drill in the special kit is a exclusive drill designed to prevent slipping.

Short Long



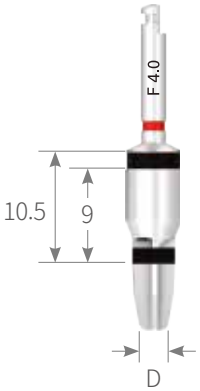
Ordinary drill can result in slipping



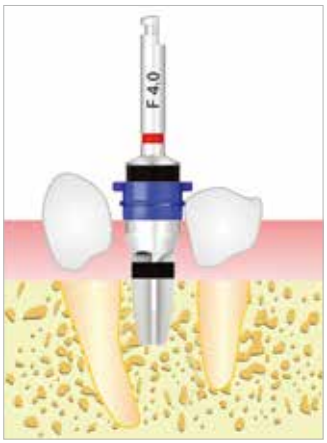
Stable drilling when point straight drill is used

▸ Solution ③ : Profile drill

Useful in flattening work on bone remaining after extracting tooth with profile drill.



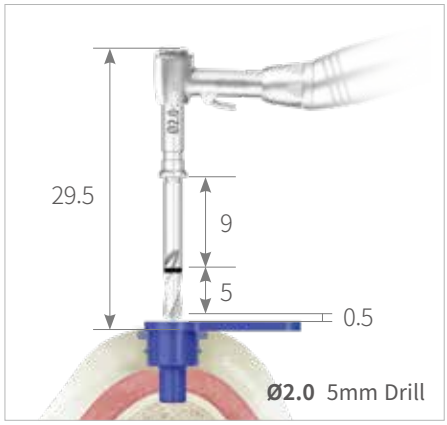
[GPD 4005M]



2 Case with small opening

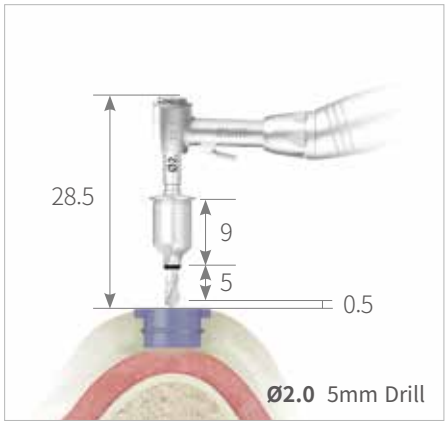
In procedure in molar area for patient with small opening (Mostly for moral tooth No. 2) + DIOnavi. Master Kit

▸ Normal Case



At the time of DIOnavi. operation, the opening of the mouth becomes about 20mm higher than ordinary operation, thereby making entry of the drill difficult in molar area.

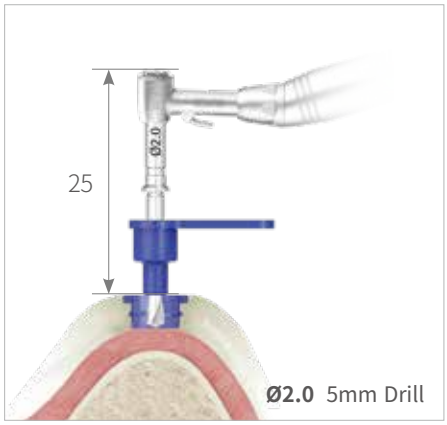
▸ Solution ①



Use 5mm Drill

With 5, 7 and 10mm, increase sequentially beginning with shorter drill.

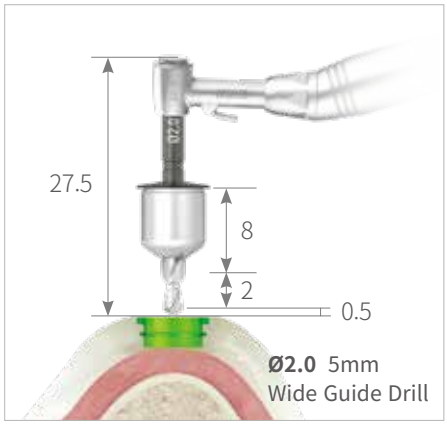
▸ Solution ②



Attach guide after binding drill tube and 5mm Drill outside the intra oral

If guide is attached after attaching Ø2.0 x 5mm Drill to the drill tube outside the intra oral, it can reduce the height.

▸ Solution ③



When using wide sleeve and wide initial drill

Use wide sleeve and exclusive Kit for kit.

3 Sinus Case

① DIOnavi. Surgical Kit preparation

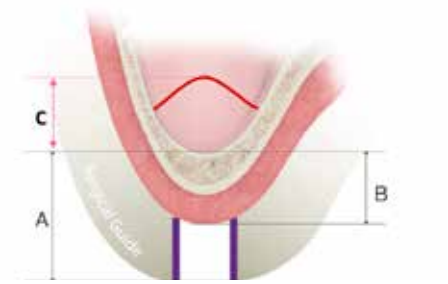
In sinus case procedure using the guide, both the DIOnavi. Master Kit and DIOnavi. Flapless Crestal Sinus Kit must be prepared in advance.

DIOnavi. Master Kit

+

DIOnavi. Flapless Crestal Sinus Kit

*** Values that need to be checked in the surgery**

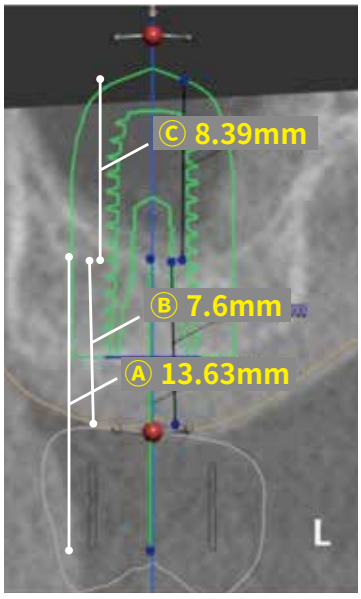


Ⓐ Length from the top of the surgical guide sleeve to the bottom of the maxillary sinus.

Ⓑ Length from the bottom of the maxillary sinus to the gum.

※ Able to identify the depth with the scale using bone condenser & depth gauge.

Ⓒ Height of lifting maxillary sinus and bone graft.



② Use tool in the sinus case surgery

Fixate by binding the anchor screw after drilling outside the surgical guide.

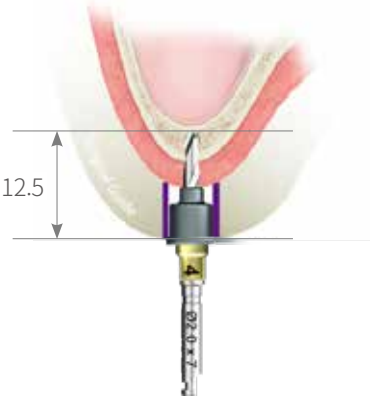
▸ Initial drill & Straight drill

After using the tissue punch and bone flattening drill of DIOnavi. Master Kit, drill sequentially binding the stopper to the initial drill and straight drill.

*** Initial drill – Form embedding hole (Osteotomy site)**

- Form drilling hole using Ø2.0 initial drill.
- Drill to 1~1.5mm below the bottom of the maxillary sinus with the height of the bone at the bottom of the maxillary sinus measured from the CT as a reference.

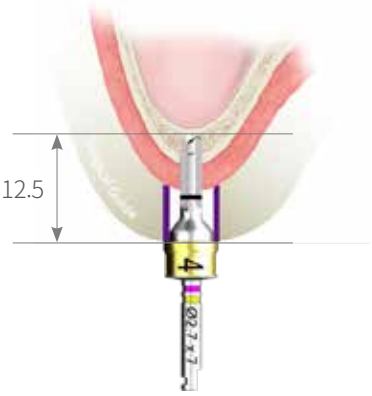
※ Drill tube : Secure fixation for more accurate position and direction.



Caution ① Must use stopper for depth control.
② Low drilling without injecting water. (100 rpm / 55Ncm)
③ Use Ø2.0 initial drill in the DIOnavi. Master Kit.

*** Straight drill – Drilling hole expansion and access to lower edge**

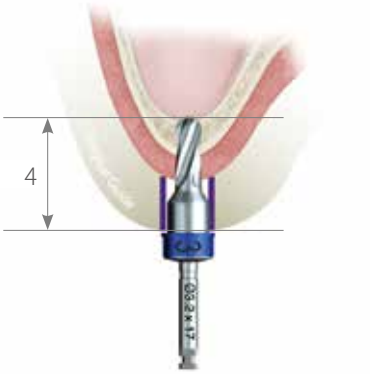
Expand the drilling hole using the straight drill sequentially.



Caution ① Must use stopper for depth control.
② Low drilling without injecting water. (100 rpm / 55Ncm)
③ Use Ø2.0 Initial drill in the DIOnavi. Master Kit.

▸ Sinus drill for perforation in the maxillary sinus basal bone

Penetrate through with force while drilling 1mm deeper than the drilling in the previous stagedrilling in the previous stage.



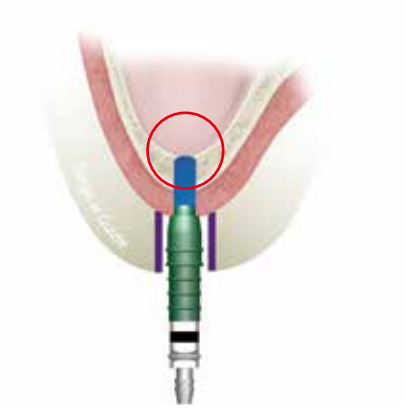
Caution Make sure to use stopper for depth control and low speed drilling without injecting water. (10 rpm)

Tip How to controll depth when using sinus drill.
① Length can be controlled using stopper.
② It can be used fixing stopper and changing the length of drill.
③ Sinus drill : 17mm / 18mm / 19mm / 21mm (Option)

▸ Water membrane lifter–Lift sinus membrane

Inject saline solution into the drilling hole using water membrane lifter after removing the guide.

- Inject approximately 0.6cc for lifting the membrane.
- Compute the quantity of injection as you experience pressure when injected.



*** Section with exertion of pressure**

About 0.5cc is injected before the pressure is exerted.
At this time, inject about 0.4cc more except the quantity already injected and lift the membrane.

※ Before pressure is exerted, injection quantity differs in the height and expansion quantity of the bone.

*** Penetration of the lower edge of maxillary sinus (A)**

Pressure can be felt when saline solution is injected and the pressure falls as the membrane is lifted and saline solution is injected again.

*** If the lower edge of maxillary sinus (A) is not penetrated**

After feeling pressure as saline solution is injected, it is not possible to exert pressure any more or the nozzle is pushed out.

※ Retry after drilling 1mm deeper with sinus drill.

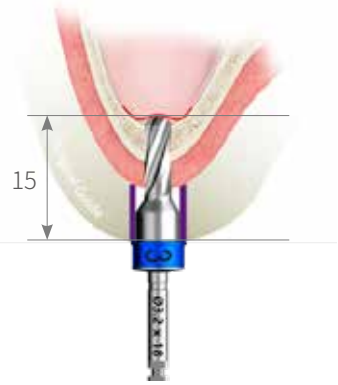
*** Check lifting of maxillary sinus membrane**

Aspire saline solution while maintaining the nozzle to the hole.
The status of aspirational level from the saline solution inserted displays whether the membrane is safely intact.

※ Mixture of blood will flow.

▸ Sinus drill–Penetrate the lower edge of maxillary sinus

After lifting the maxillary sinus membrane, drill 1mm deeper with sinus drill to completely penetrate through the lower edge of maxillary sinus. It can be checked whether lower edge of maxillary sinus is penetrated using bone condenser.



Caution
① Make sure to use stopper for depth control.
② Low speed drilling without injecting water. (10 rpm / 35Ncm)
③ Use after attaching stopper to the bone condenser.
④ If bone graft material is injected without being penetrated, it can ocuur that the bone graft material cannot be injected any further.

② Use tool in the sinus case surgery

Fixate by binding the anchor screw after drilling outside the surgical guide.

▸ Initial drill & Straight drill

After using the tissue punch and bone flattening drill of DIOnavi. Master Kit, drill sequentially binding the stopper to the initial drill and straight drill.

▸ Bone condenser – Injection of bone graft material

Inject the bone graft material into the maxillary sinus through the drilling hole to bone condenser after removeing surgical guide.

- DIOnavi. sponge type bone graft material is recommended.
- Bone graft material can maintain the space lifting up the membrane within the maxillary sinus.
- In the case of embedding implant immediately after bone graft, implant helps maintenance of space within the maxillary sinus and promotes osteogenesis along with the sponge type of bone graft material.

Caution Must use stopper for depth control.

*** Determine the volume of bone graft material**

Height of sinus membrane lifting	1mm	2mm	3mm	4mm	5mm	6mm	7mm	8mm	9mm	10mm
When implant is embedded	0.1cc	0.2cc	0.3cc	0.4cc	0.5cc	0.6cc	0.7cc	0.8cc	0.9cc	1.0cc
When implant is not embedded	0.3cc	0.6cc	0.9cc	1.2cc	1.5cc	1.8cc	2.1cc	2.4cc	2.7cc	3.0cc

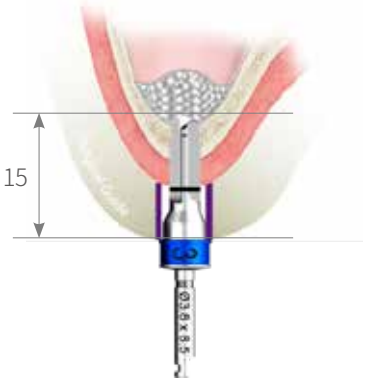
▸ Depth gauge – Dispersion of bone graft material (Option)

After surgical guide is removed, place and rotate depth gauge into the maxillary sinus and disperse the bone graft material.

Caution Use stopper for depth control.

▸Final drilling

Drill 2mm deeper than the depth of the sinus drill after attaching surgical guide.



Caution
① Make sure to use stopper for depth control.
② Low speed drilling without injecting water. (100 rpm / 55Ncm)
③ It is recomentd that drill below 1~2 level is used if the osseous tissue is weak.

▸Abutment profile drill

Remove alveolar bone that interferes when abutment or H-scan body is bound.
Produce abutment profile rotating the drill along the inner sleeve.

※ Increase rpm while injecting water if cortical layer is thick. (800 rpm)
※ It can be limited if the remaining bone is 1~2mm after penetration of the sinus.

▸Implant connector - Fixture embed

After embedded using Surgical guide, the implant that entered the maxillary sinus disperse the bone graft material by pushing it out.

Tip Embed fixture according to the quantity of remaining bones.
- If it is more than 4mm, implant can be firmly fixated in the initial stage and be embedded immediately and restoration of the temporary prosthesisn is possible.
- If it is thinner than 3mm and implant can not be innitially fixated, execute only maxillary sinus bone graft without embedding implant at once.

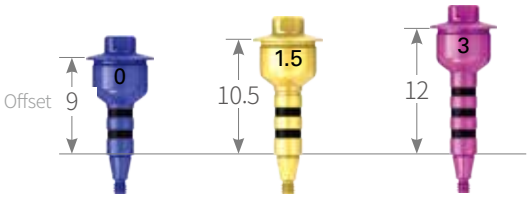
Caution Low speed drilling without injecting water in embedding implant (30 rpm / 35Ncm)

4 Edentulous Case

How to fixate in edentulous case + DIOnavi. Special Kit

DIOnavi. Special Kit

Pin

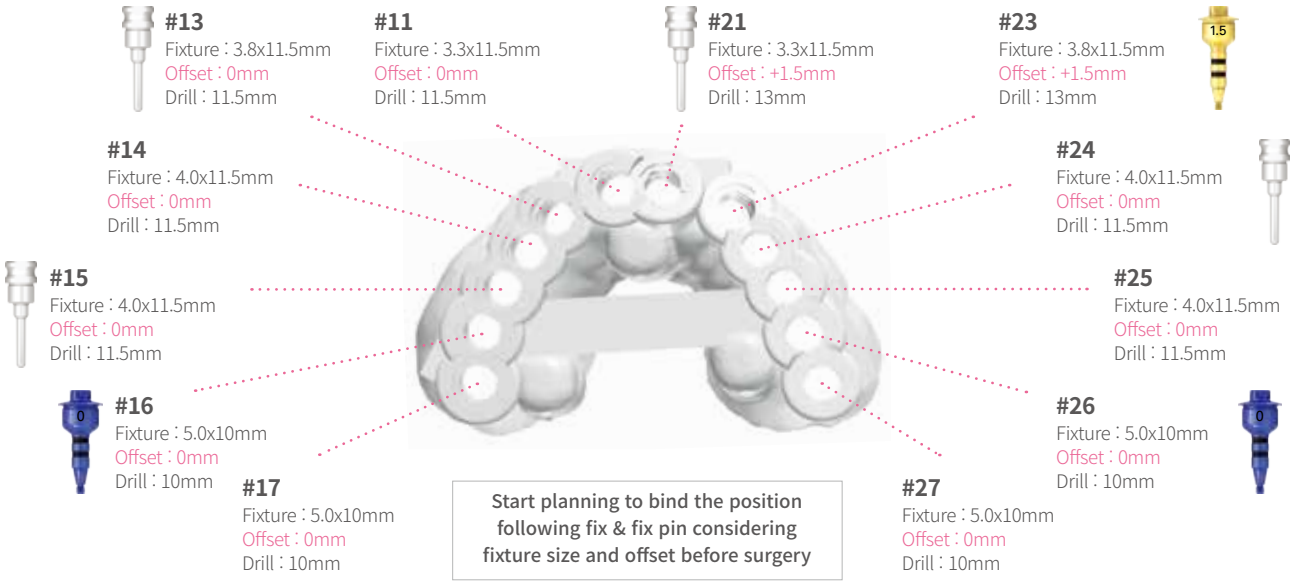


[SGF 6309] [SGF 6310] [SGF 6312]

* Fix includes 9mm, 10.5mm and 12mm depending on the sleeve offset.

▸ Edentulous fixation guide fix & fix pin

Without producing Hole, it can be fixated in the place when implant is embedded.



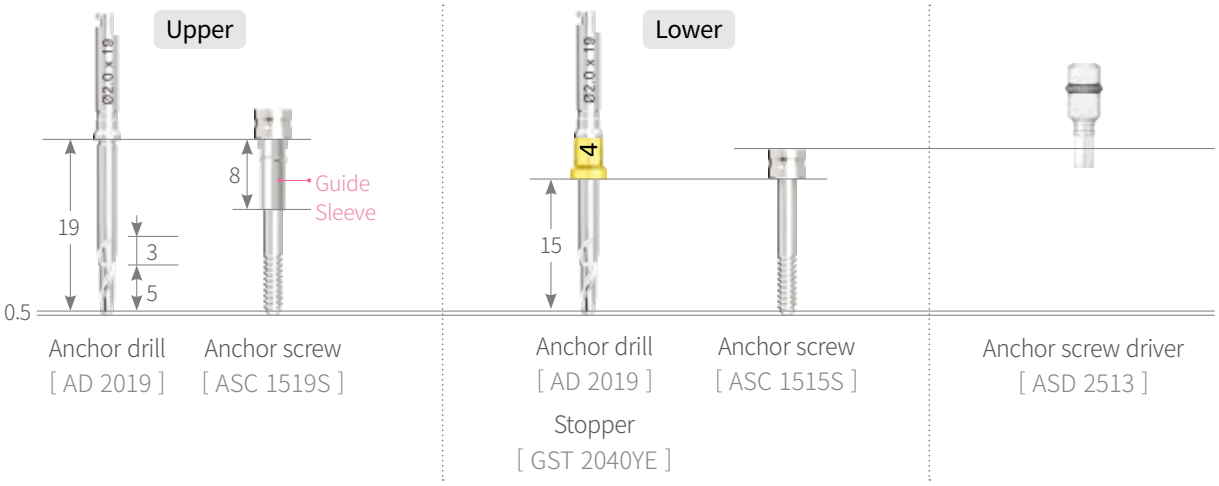
Start planning to bind the position following fix & fix pin considering fixture size and offset before surgery

*** Example : How to fixate edentulous case**

Caution It is recommended that thick bone is used in the part of fixed pin.

▸ Anchor drill & Anchor screw

It is fixed in the side of guide.



TIP In the case of mandible, make sure to use 4mm stopper and exclusive anchor screw.

Caution When binding anchor screw.

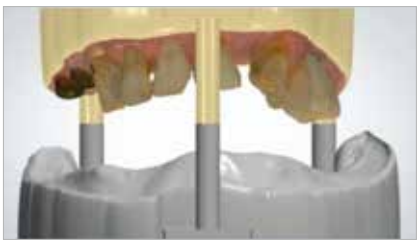
① Bind with hand.

② Make sure to bind several holes simultaneously since the guide can become crooked if it is bound 100% for 1 hole and then other holes successively.

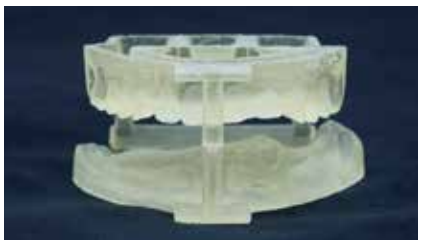
③ To prevent gum from causing misplacement, push carefully through.

* Anchor process

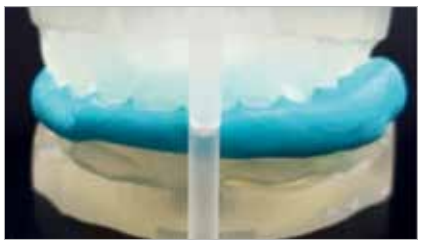
① Anchor planning



② Design articulator



③ Produce articulator



④ Fixed bite is produced using articulator

⑤ Guide is attached in the intra oral using fixed bite

※ It can not be produced if errors in bite taking are found in scan files and plaster models.
It is recomentd that fixed bite is produced in the intra oral.

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